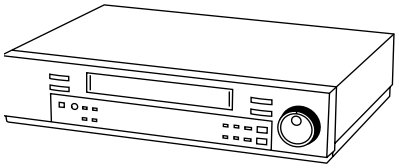

TLR2024
Time-Lapse VCR

Installation/
Operation Manual

C650M (12/98)

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REVISION HISTORY

Manual #	Date	Comments
C650M	12/98	Original version.

WARNING

RISK OF ELECTRIC SHOCK
DO NOT OPEN

WARNING: TO REDUCE THE RISK OF ELECTRIC SHOCK
DO NOT REMOVE COVER (OR BACK)
NO USER-SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

AVERTISSEMENT

DANGER D'ÉLECTROCUTION
NE PAS OUVRIR

AVERTISSEMENT: POUR ÉLIMINER TOUT RISQUE D'ÉLECTROCUTION, NE PAS OUVRIR LE COUVERCLE (OU LA PARTIE ARRIÈRE). AUCUNE PIECE RÉPARABLE PAR L'UTILISATEUR NE SE TROUVE À L'INTÉRIEUR. POUR TOUTE INTERVENTION D'ENTRETIEN OU DE RÉPARATION SE CONFIER AUX TECHNICIENS QUALIFIÉS.

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

La flèche symbolisant l'éclair dans un triangle équilateral a pour objet de tirer l'attention de l'utilisateur sur le fait, qu'il y a des tensions dangereuses non-isolées à l'intérieur de l'enceinte du produit qui peuvent être suffisamment impor-tantes pour conduire au risque d'électrocution.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment.

Le point d'exclamation au sein d'un triangle équilateral a pour objet de tirer l'attention de l'utilisateur sur le fait qu'il y a des instructions de mise en service et d'entretien (de réparation) dans les fiches descriptives de l'appareil qui doivent obligatoirement être respectées.

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

CAUTION:

TO PREVENT ELECTRIC SHOCK DO NOT USE THE POLARIZED PLUG WITH AN EXTENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

AVERTISSEMENT:

AFIN D'ÉVITER TOUT RISQUE D'INCENDIE OU D'ÉLECTROCUTION, NE PAS EXPOSER CET APPAREIL À LA PLUIE NI À L'HUMIDITÉ.

ATTENTION:

POUR PRÉVENIR LES CHOCS ÉLECTRIQUES NE PAS UTILISER CETTE FICHE POLARISÉE AVEC UN PROLONGATEUR, UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ÊTRE INSÉRÉES À FOND SANS EN LAISSER AUCUNE PARTIE À DÉCOUVERT.

1.1 SAFEGUARDS, WARNINGS, CAUTION, AND CARE

Observe the following WARNINGS before installing and using this product. Follow all warnings and instructions marked on the VCR.

Instructions

Read all the safety and operating instructions before operating the VCR. Keep the instructions for future reference. Follow all operating and use instructions. Heed all warnings on the equipment and in the operating instructions.

Installation/Servicing

Installation and servicing should be done by qualified service personnel only and conform to all local codes. Do not try to service this VCR yourself. Opening or removing covers may expose you to dangerous voltage or other hazards.

Damage Requiring Service

Unplug the VCR from the wall outlet and refer servicing to qualified service personnel under the following conditions:

1. When the power cord or plug is damaged.

2. If liquid has been spilled, or objects have fallen into the VCR.

3. If the VCR does not operate normally when following the operating instructions.

   Adjust only those controls covered by the operating instructions. Improper adjustment of other controls may cause damage and will often require extensive work by a qualified technician to restore the VCR to normal operation.

4. If the VCR was dropped or the cabinet damaged.

5. When the VCR shows a distinct change in performance–this indicates a need for service.

Replacement Parts

Be sure the service technician uses only replacement parts Pelco recommends, or which have the same characteristics as the original part. Unauthorized substitutions may cause fire, electric shock, or other hazards.

Safety Check

Upon completion of any service or repair to the VCR, ask the service technician to perform safety checks to determine whether it is in safe operating condition.

Water/Moisture/Condensation

Do not use this VCR near water. It is designed for indoor use only and must not be installed where exposed to rain and moisture.

Do not place objects containing water, such as drinks, on top of the VCR.

If the VCR is exposed to a rapid increase in temperature (such as warming a cold room or after moving it from a cold location to a warm one), condensation may form on the tape transport mechanism inside the VCR. To prevent damage to the VCR or tapes, plug the VCR into the AC outlet and turn the power on for about two hours. Do not play back or record on the VCR during this time.

Condensation is likely to occur when:

1. The VCR is moved from a cold room to a warm room or from outdoors to indoors.
2. A cold room is heated quickly.
3. The humidity is very high.

Avoid using the VCR where cold air (such as from an air conditioner) will blow directly on it.

Cleaning
Unplug the VCR from the wall outlet before cleaning. Do not use liquid or aerosol cleaners. Clean with a soft cloth slightly moistened with mild detergent and water. Wipe dry. NEVER USE PETROLEUM-BASED SOLUTIONS.

Attachments
Do not use attachments not recommended by Pelco as they may cause hazards.

Accessories
Do not place the VCR on an unstable cart, stand, tripod, bracket, or table. The VCR may fall, seriously injuring a person or damaging the equipment. Use only with a cart, stand, tripod, bracket, or table recommended by Pelco, or sold with the VCR. Follow Pelco's instructions when mounting equipment, and use a mounting accessory recommended by Pelco.

Use care when moving equipment on a cart. Quick stops, excessive force, and uneven surfaces may overturn the VCR and cart combination.

Do Not Place Anything Heavy On The VCR
Heavy objects placed on the VCR will cause damage.

Ventilation
Slots and openings in the cabinet provide ventilation and ensure reliable operation of the VCR and protect it from overheating. Do not block or cover these openings. Never place the VCR near or over a radiator or heat register. Do not place it in a built-in installation such as a rack unless proper ventilation is provided or Pelco's instructions have been followed. There are many ventilation holes on the bottom of the VCR–for maximum ventilation, place it on a hard level surface only.

Power Sources
Operate this VCR only from the type of power source indicated on the marking label. If you are unsure of the type of power supply, consult your equipment dealer or local power company.

Grounding or Polarization
This VCR is equipped with a three-wire grounding-type plug–a plug having a third (grounding) pin. This plug only fits into a grounding-type outlet. This is a safety feature. If you cannot insert the plug into the outlet, contact an electrician to replace the obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.

WARNING: The included power cord is used for 120 VAC, 60 Hz. Never connect to any outlet or power supply having a different voltage or frequency.

Power Cord Protection
Do not damage the power cord; it may cause fire or shock hazard. Route the power cord so it is not likely to be walked on or pinched by items placed on or against it. Pay particular attention to the cord at the wall plug or convenience receptacle and the point where it connects to the VCR. When unplugging the power cord, grasp the plug and remove it carefully.

Lightning/Power Surges
Unplug the VCR from the wall outlet for its added protection during a lightning storm or when it is unused for long periods. This prevents damage to the VCR from lightning and power line surges. Pelco recommends using conditioned-output uninterruptible power supplies (UPS) and/or surge protected outlets to maximize protection of the VCR.

When Not in Use
When you finish operating the VCR, always unload the cassette and turn off the power.

Overloading
Do not overload wall outlets and extension cords as this increases the risk of fire and electric shock.

Object and Liquid Entry
Never push objects of any kind into the VCR through openings. They may touch dangerous voltage points or short out parts that could result in a fire or electric shock. It can also cause extensive damage to the mechanism. Never spill liquid of any kind on the VCR.

Care of Video Cassette Tape

1. Avoid violent vibration and shock.
2. Do not place near a strong magnetic field (near a motor, transformer, or magnet).
3. Never place or store in direct sunlight.
4. Avoid dusty places.
5. Place the cassette in the cassette case and store vertically.
6. Never store tapes in a high humidity location.

1.2 REGULATORY NOTICES

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

INFORMATION

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

INFORMATION

Cet appareil numérique de la classe B respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

1.3 UNPACKING INSTRUCTIONS

Unpack and inspect all parts carefully.

Be sure to save the shipping carton, boxes and inserts. They are the safest material in which to make future shipments.

If an item appears to have been damaged in shipment, replace it properly in its box and contact the factory at 1-800-289-9100 or 1-559-292-1981 for a replacement. (International customers fax 1-559-348-1120 for authorization and instructions.)

If an item needs to be returned to the factory for repair, consult the WARRANTY AND RETURN section of this manual for instructions.

2.0 OVERVIEW

2.1 INTRODUCTION TO TIME-LAPSE RECORDERS

Time-lapse recording permits longer than ordinary recording times. The primary reason for using time-lapse recording in a CCTV security system is that a single VCR tape can be used for an extended period of time beyond the standard recording time. The following explains how time-lapse recording works.

The actual recording on VCRs is a series of still pictures or fields. Standard consumer VHS recorders store 60 fields (30 frames) per second. AT-120 cassette lasts just two hours in this mode (SP mode). You can get slightly longer recording times (six hours) using the extended recording mode (EP mode). You can record even longer on a T-160 cassette in these modes: two hours and 40 minutes in SP mode and eight hours in EP mode. (Refer to the table in Section 8.1.1 for actual recording times in different modes.)

Time-lapse VCRs, however, use microprocessor-based techniques to record fewer fields per second than a normal VHS machine and extend recording time. This negates the need to change the tape every two hours–and also substantially reduces viewing time when the recording is played back, another important consideration.

In normal VCR operation, all video head scans (60 per second) are recorded. But in time-lapse mode the tape runs more slowly and records pictures periodically. In 12-hour mode, a normal time-lapse machine records 10 fields per second, and in 24-hour mode, it stores just five fields per second (for up to 12 and 24 hours on a tape, respectively). Longer times are possible by slowing the recording rate further.

At normal speed a picture is recorded every 1/60 of a second so there is little change over five frames. In longer time-lapse modes, however, a field is recorded intermittently over a longer period of time so changes are apparent from field to field.

The time-lapse recording can be played back at normal two-hour tape speed, which makes for rapid review–one of the time-lapse recorder's most important advantages. Action on the tape, however, appears faster than normal.

As an advanced feature, time-lapse recorders (like the TLR2024) can automatically switch from time-lapse to real-time recording when an alarm condition occurs. This is important since the primary purpose of recording an event is identification, and real-time recording provides more detail.

2.2 TLR2024 FEATURES AND FUNCTIONS

The TLR2024 time-lapse VCR is a powerful surveillance tool designed for industrial and security recording. In addition to ordinary two-hour and six-hour recording modes, it has time-lapse modes that allow recording in 12- and 24-hour modes. The TLR2024 features frame-by-frame playback and high-speed playback of longer recordings.

Audio Recording–Audio recorded in 2H, 6H, L(inear)12H, or L24H modes is played back only in its respective mode.

Resolution And Image Quality–This VCR has a high-quality circuit allowing more than 330 lines in B/W (black and white) mode, and more than 240 lines in color mode.

Automatic Head Cleaning–The VCR automatically removes foreign matter from the heads when a cassette is inserted for continuous smooth operation.

Easy Setup Using A Monitor–The on-screen menus simplify setup programming. You can select these menus even without inputting a video signal.

Easy Cueing With Alarm Recording–Index signals are automatically added at the beginning of alarm recording for easy cueing. You can even use the monitor to confirm the starting time of alarm recording.

External Time Clock Adjustment–You can reset the on-screen clock to the nearest hour by applying a signal to the RST (reset) IN terminal at the rear of the VCR.

Record Check–You can confirm correct recording by pressing the PLAY button during recording.

Special Playback Features–These include still images, speed search, reverse playback, frame-by-frame viewing in both directions, slow-motion, and high-speed viewing.

JOG Dial/SHUTTLE Ring–You can use these controls to search for the desired image. You can adjust the playback speed with the SHUTTLE ring and search for an image frame-by-frame with the JOG dial.

Recording Options–This versatile system offers a variety of recording options, including daily and weekly timer recording, repeat, and alarm recording.

NOTE: The battery backup is for memory only–the VCR does not continue recording if the power goes out. If you want to keep recording during an outage, make sure the VCR system is on your UPS (uninterruptible power supply) system.

Protection Against Power Failures–Recording data (including date, time, and timer setup) is stored in backup memory, so the system can resume recording after a power failure. The monitor displays the time of the failure.

Digital <ELAPSED TIME> Display–The elapsed time of recording and playback is stored in non-volatile memory. You can use the elapsed time display as a guide to when to do periodic maintenance.

Tape Use Counter–This counter displays how many times you have recorded on a tape. This helps you decide when you need to replace a tape.

Daylight Saving Time Setting–A daylight saving time setting is available. You can set the clock forward an hour by programming the menu.

3.0 QUICK START

3.1 BASIC START

NOTE: This section is intended for people experienced in working with time-lapse recorders and installing CCTV systems. (However, you might want to take a few minutes to review the material in Section 1.0.)

1. Decide where to locate the VCR. Do all system hookups first (camera, multiplexer, etc.) if you are installing the VCR in a location where you cannot access its rear panel.
2. Connect the VCR to other equipment (Sections 4.2 and 4.3).
3. Plug in the VCR and press the POWER button. You should see the time and date displayed on the monitor.
4. To reset the time/date (First Time Set Up menu), see Section 6.9.2. Skip if you do not want to reset the time/date.
5. Put in a T-120 or T-160 tape, refer to Table B for recording times.
6. Put the VCR in the recording mode you want by pressing the REC/PLAY (+) and (-) buttons. Watch the fluorescent display. Set the recording speed to 2H, 6H, L12H, or L24H.
7. Press REC to begin recording.
8. Press STOP to stop. Turn the SHUTTLE ring right to fast forward and left to rewind. Press PLAY to play back the tape.
9. Refer to Section 11.1 for initial system testing information.

3.2 ADDITIONAL ITEMS

You can also incorporate the following programming steps for more than a basic quick setup.

1. If desired, set the tape end and quasi v-sync options (Section 6.9) on the First Time Set Up menu.
2. If desired, set the display mode and time/date size options (Section 6.4) in the Display menu.
3. If desired, program for timer recording in the Timer Program menu (Section 6.5).
4. If desired, in the Recording Set Up menu (Section 6.6), program for alarm recording mode and duration (Section 8.3.3) and emergency recording (Section 8.3.4).
5. If desired, in the Rear Terminal menu (Section 6.7), program for call out (Section 8.1.5 for series recording), clock out, operation of the mode out terminal, and operation mode of the REC IN terminal.

4.0 INSTALLATION

4.1 PRE-INSTALLATION CAUTIONS

1. Provide secure power to system components. Prevent overloading or shorting by dedicating power circuits to the surveillance equipment. Restrict access to the surveillance system circuit breakers, switches, and equipment power cords.

2. Surveillance system components must be operationally compatible. Time-lapse recording speeds and dwell times of any accessory switching equipment must be compatible with each other.

3. The TLR2024 time-lapse VCR provides multiple alarm recording speeds so it is important that alarm triggering of components be operationally compatible. Refer to Section 2.1 for information on time-lapse recording.

4. Complete all system hookups (camera, multiplexer, etc.) before installing the VCR in a location where you cannot access its rear panel.

4.1.1 Securing the VCR Controls

Protect surveillance equipment to forestall tampering. We recommend putting the recorder in a secure VCR cabinet. Pelco offers such units–the RM2000, which is a rack kit for a single VCR, and the RM2004, which is a rack kit for four VCRs.

4.1.2 Monitor Tips

- Pelco recommends using a CCTV monitor.
- Some monitors may cause picture vibration or picture distortion at the top or bottom of the image during still or normal playback. (Refer to Section 9.4.3 for information.)

A television may be unable to provide a stable picture without vibration or distortion.

4.2 INSTALLATION

1. Remove the VCR and all cables from the box.

2. Place the VCR in a suitable location.

   - If the location is unsecured, refer to Section 4.1.1 for information about products to lock up the VCR.
   - Do all system hookups (camera, multiplexer, etc.) before installing the VCR in a location where you cannot access its rear panel.

3. If installing in a rack, place the VCR in the rack before making cable and power connections. Refer to the documentation included with the rack kit for specific installation instructions.

4. If you are not using a switcher, refer to Figure 1.

   - Connect the camera (video output) to the rear of the VCR (video input BNC). Connect the VCR (video output BNC) to the monitor (video input).
   - Connect the alarm input to the VCR (SET IN and GND [ground] terminals).
   - If you are using a 600 Ω microphone, connect it to the VCR (MIC IN jack). Connect the VCR (audio output connector) to the monitor (audio input).

5. If you are using a switcher, refer to Section 4.3.

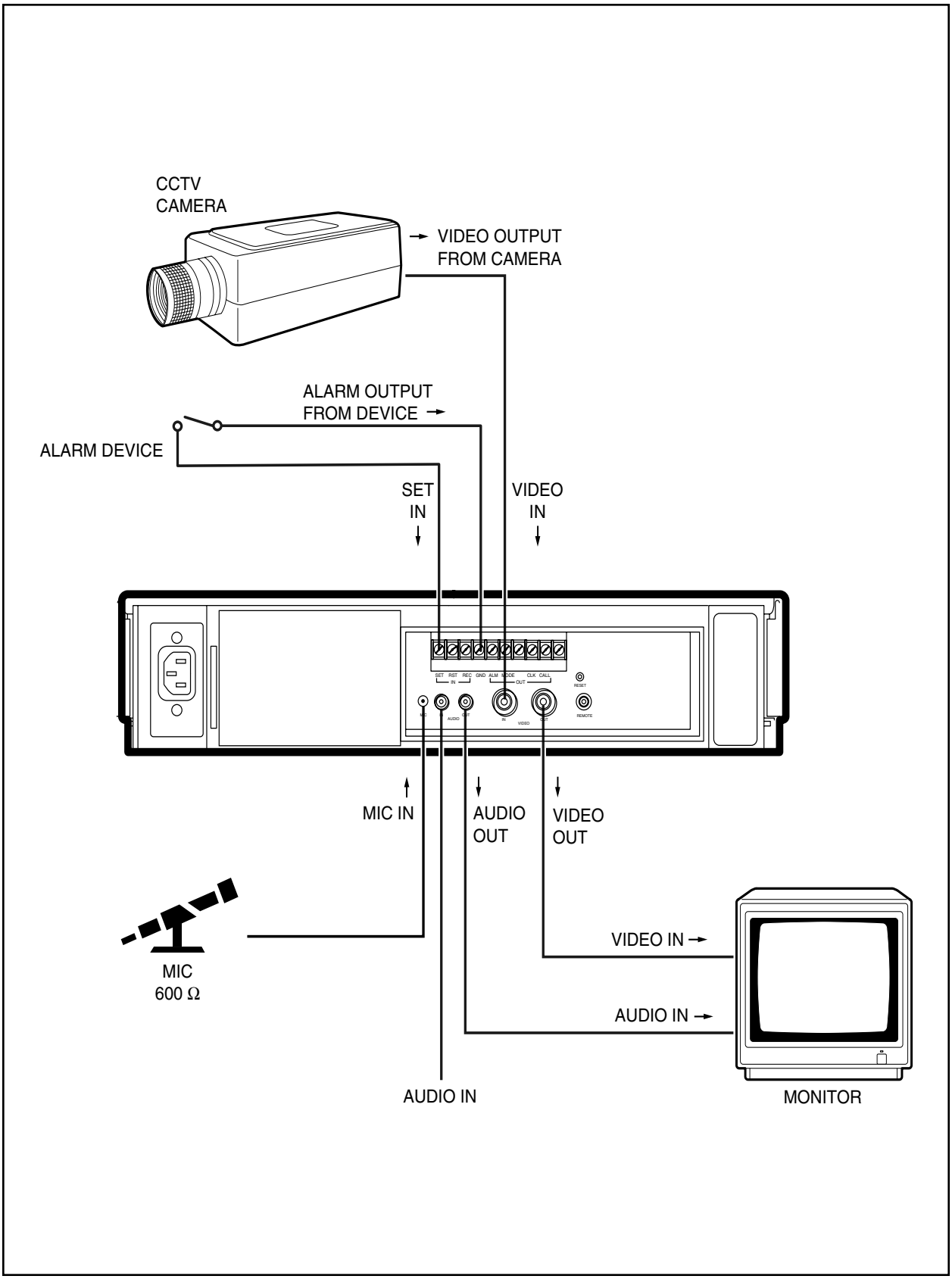


Figure 1. Typical System Setup

4.3 CONNECTING THE VCR TO A MULTIPLEXER

NOTE: Cameras and monitors are connected to the multiplexer. Figure 2 shows the connection between the VCR and an MX4000 Series Genex™ Multiplexer. Refer to the multiplexer manual for additional component connections.

Figure 2 shows how to connect the VCR to an MX4000 Series Genex™ Multiplexer.

- **For Automatic Speed Tracking** ("B" lines in Figure 2)

  This lets the VCR control the multiplexer's recording speed. It is the most efficient recording method.

  1. Connect the VCR's CLK output to the multiplexer's head switching (HS) input to synchronize camera switching.
  2. Connect the multiplexer's ground terminal to the VCR's GND terminal.

- **For Alarm Recording** ("A" lines in Figure 2)

  This is to start and stop recording when there are alarms.

  1. Connect the multiplexer's normally open (NO) relay terminal to the VCR's SET IN (alarm input) terminal.
  2. Connect the common C terminal to the VCR's GND terminal.

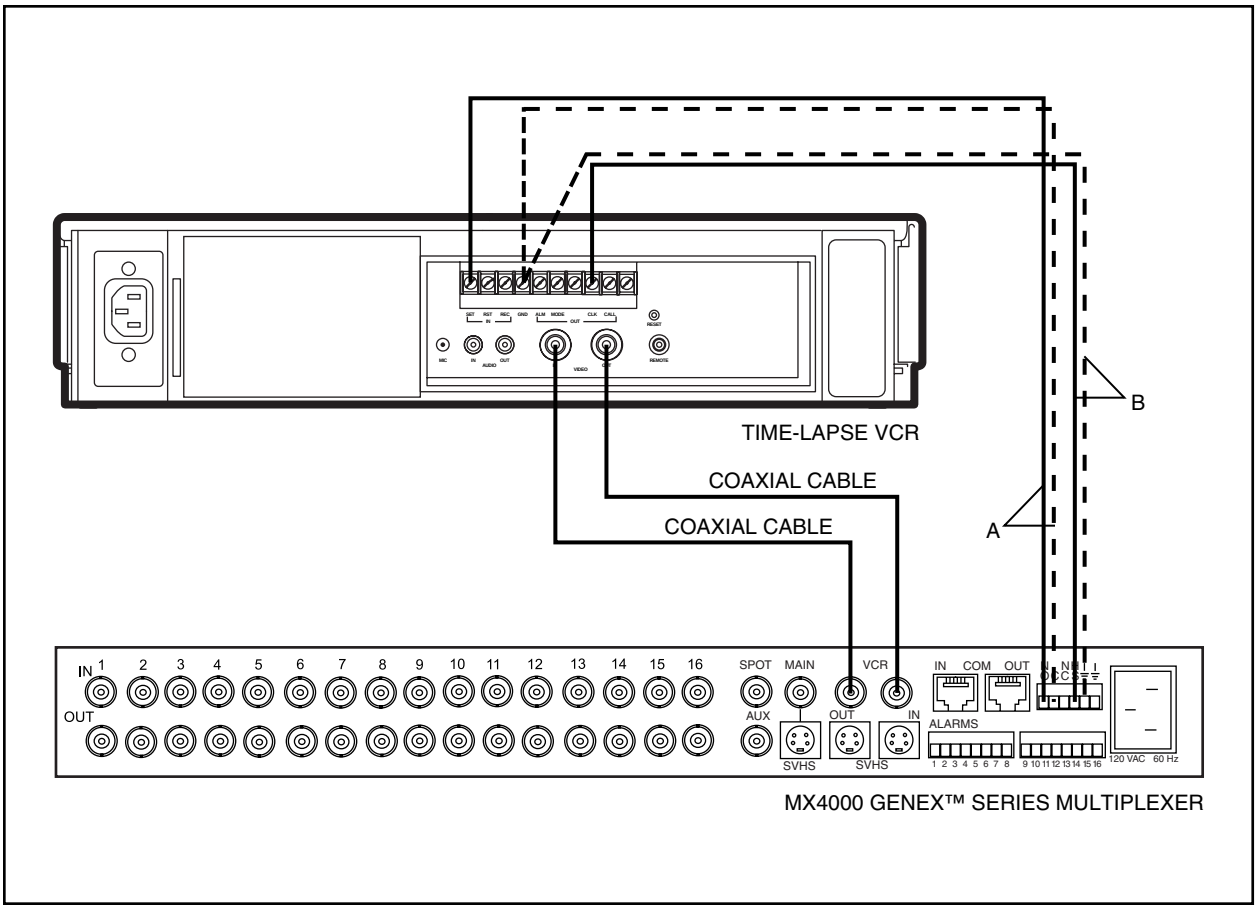
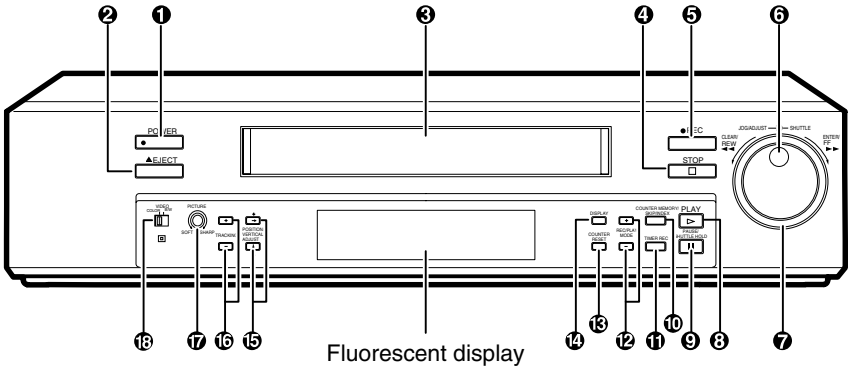


Figure 2. Connecting VCR to Multiplexer

5.1 FRONT PANEL



1. **POWER button**
   Press for on; press again for off. The POWER indicator illuminates when the VCR is turned on.

2. **EJECT button**
   Press to remove the cassette.

3. **Cassette loading slot**
   Insert the cassette in this slot to load it.

4. **STOP button**
   Press to halt all tape-related functions.

5. **REC (record) button**
   Press to begin recording.

6. **JOG dial**
   Use to advance the tape frame-by-frame and to program the menus.

7. **SHUTTLE ring**
   Use to adjust the playback speed and to program the menus. Turn this ring to the right to advance the tape or to forward search. Turn it to the left to rewind a tape or to reverse search. You can also use it to clear the alarm list, power loss list, timer recording, and to initialize the menu programming. It also lets you program or exit the menus after setup.

8. **PLAY button**
   Press to play back a previously recorded tape.

9. **PAUSE/SHUTTLE HOLD button**
   Press this button during recording to temporarily stop tape movement. Press again to resume recording. When it is pressed during playback, tape movement stops and a still field is displayed. Press again to restore normal playback. Pressing and holding this button after turning the SHUTTLE ring allows continuous high-speed playback even if the SHUTTLE ring is released.

10. **COUNTER MEMORY/SKIP/INDEX button**
    Press this button to switch among counter memory (fluorescent display shows M), skip search (displays SKIP), and index search (displays INDEX).
    Counter Memory: Turn the SHUTTLE ring to the right and the tape rewinds to the 00000 counter position and stops (Section 10.1.1).
    Skip Search: The VCR fast forwards or rewinds until it locates an index signal and then plays back for about four seconds in 2H or 6H mode, doing this until it reaches the end or beginning of the tape (Section 9.3.2).
    Index Search: During fast forward or rewind, the VCR searches for alarm signals. When it finds one, the VCR plays back the tape and stays in still mode (Section 9.3.1).

11. **TIMER REC button**
    Press to make a timed recording.

12. **REC/PLAY MODE buttons**
    Set to 2H, 6H, L12H, or L24H mode for recording; and to 2H, 6H, L12H, 12H, L24H, or 24H for playback.

13. **COUNTER RESET button**
    Press to reset the counter to 00000.

14. **DISPLAY button**
    Press to display the Main menu. Press again to show the time display.

15. **POSITION/VERTICAL ADJUST buttons (+/-)**
    - Pressing the (+) button moves the day and time display to the right. Pressing the (-) button moves the day and time display down the screen. The display cannot be adjusted if a warning is displayed.
    - Pressing either button minimizes vertical jitter in the still mode or during fast playback. Refer to Section 9.4.3 for details.

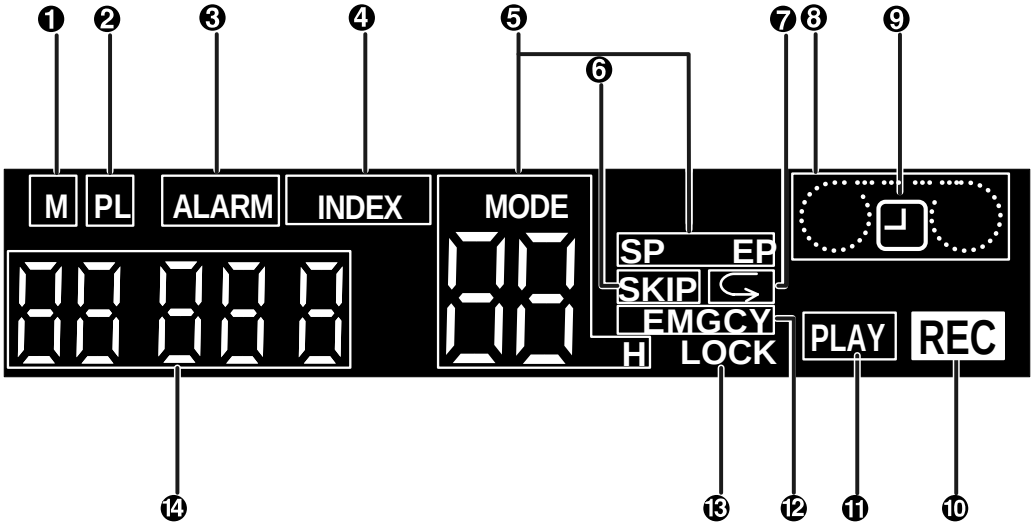
16. **TRACKING buttons (+/-)**
    Press these buttons if noise is present during playback, reverse playback, or slow playback.

17. **PICTURE control**
    Use this control to adjust picture quality between soft and sharp.

18. **VIDEO switch**
    Use the switch to select color or black and white recording and playback.

Figure 3. Front View

5.2 FLUORESCENT DISPLAY



1. **M (counter memory) indicator**
   Illuminates during rewind for counter memory mode.

2. **PL (power loss) indicator**
   Illuminates when there is a power failure during recording.

3. **ALARM indicator**
   Flashes during alarm recording and stays on when the alarm recording is finished.

4. **INDEX indicator**
   Flashes during recording of the index signal and lights during an index search.

5. **MODE display**
   Displays the selected recording or playback mode. During an index search, it displays the index number. EP lights to indicate recording in 6H mode or playing back a tape recorded in 6H mode. SP lights to indicate recording in 2H, L12H, or L24H mode or playing back a tape recorded in 2H, L12H, 12H, L24H, or 24H mode.

6. **SKIP indicator**
   Illuminates during skip search.

7. **Repeat indicator**
   Illuminates when TAPE END in the First Time Set Up menu is set to REPEAT or ALARM•PROT.

8. **Cassette status indicator**
   Illuminates when you insert the tape. The light advances, stops, or flashes corresponding to the movement of the tape.

9. **Timer recording indicator**
   Illuminates when the TIMER REC button is set to ON.

10. **REC indicator**
    Illuminates during recording.

11. **PLAY indicator**
    Illuminates during playback.

12. **EMGCY (emergency recording) indicator**
    Illuminates when EMERGENCY REC in the Recording Set Up menu is set to ON.

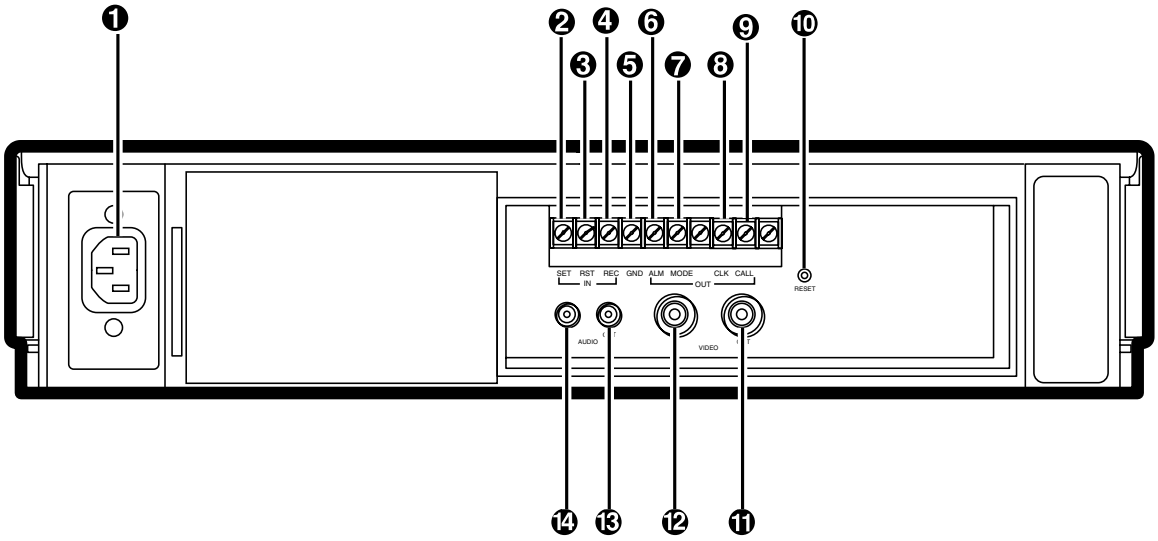
13. **LOCK indicator**
    Illuminates when the lock feature is in use.

14. **Counter display**
    Indicates the relative position of the tape.

Figure 4. Fluorescent Display

5.3 REAR PANEL

WARNING: The included power cord is used for 120 VAC, 60 Hz. Never connect the power cord to any output or power supply having a different voltage or frequency.



NOTE: Make sure the power cord is unplugged before making any rear terminal connections.

1. **AC power socket**
   The power cord plugs into this socket. Insert the cord firmly.

2. **SET IN terminal**
   (Alarm) input terminal to start alarm recording. Connect the alarm sensor here.

3. **RST (reset) IN terminal**
   Input terminal to stop alarm recording when ALARM REC DURATION in the Recording Set Up menu is set to MAN 1. Connect the alarm reset switch here. You can also use this terminal to set the on-screen clock when set to any mode other than MAN1.

4. **REC IN terminal**
   Input terminal to start/stop recording. You can also use this terminal for series recording (refer to Section 8.1.5).

5. **GND (ground) OUT terminal**
   Connect the ground lead here when a lead connected to other terminals requires a ground.

6. **ALM (alarm) OUT terminal**
   Output terminal to an external device to indicate an alarm is being recorded.

7. **MODE OUT terminal**
   Output terminal to indicate the VCR's mode of operation, which can be selected by setting the MODE OUT in the Rear Terminal menu.

8. **CLK (clock) OUT terminal**
   Output terminal to control an external camera switcher, such as the MX4000 Series Genex™ Multiplexer.

9. **CALL OUT terminal**
   Output terminal to indicate when the tape finishes recording or that there was a problem during recording.

10. **RESET button**
    Press to erase the present time, alarm recording list, power loss list, and the number of tape uses. Power to the VCR is cut off while the button is pressed. If there is a tape in the VCR and the button is released, the power indicator will light and the tape will fast forward for a few seconds. The VCR will then turn off.

11. **VIDEO OUT connector**
    Output connector for video signal (BNC connector).

12. **VIDEO IN connector**
    Input connector for video signal (BNC connector).

13. **AUDIO OUT connector**
    Audio output connector (RCA pin).

14. **AUDIO IN connector**
    Audio input connector (RCA pin).

Figure 5. Rear View

6.0 PROGRAMMING

6.1 GENERAL PROGRAMMING INSTRUCTIONS

NOTE: If the VCR is connected to an MX4000 Series Genex™ Multiplexer, make sure the multiplexer is in the VCR mode and single-camera display. Momentarily press the VIEW button on the multiplexer, then press the DISPLAY button on the VCR.

The following is a universal procedure that shows how programming is done on the VCR. **Use the JOG dial to select items, the SHUTTLE ring to the right to enter, and SHUTTLE ring to the left to exit.**

1. Press the DISPLAY button. The Main menu is displayed.
2. Turn the JOG dial to select the desired item.
   - Turn it to the right to move the cursor downward.
   - Turn it to the left to move the cursor upward.
3. Turn the SHUTTLE ring to the right. The desired item is selected and the menu will appear.
4. Turn the JOG dial to select an item.
5. Turn the SHUTTLE ring to the right. The item will flash.
6. Turn the JOG dial to change the setting.
7. Turn the SHUTTLE ring to the right to enter.
8. Press the DISPLAY button. The present time display will appear.

6.2 QUICK GUIDE TO TLR2024 MENU STRUCTURE

The operating parameters of the VCR are set through various on-screen menus. Program your choices on the menus according to the instructions on the following pages.

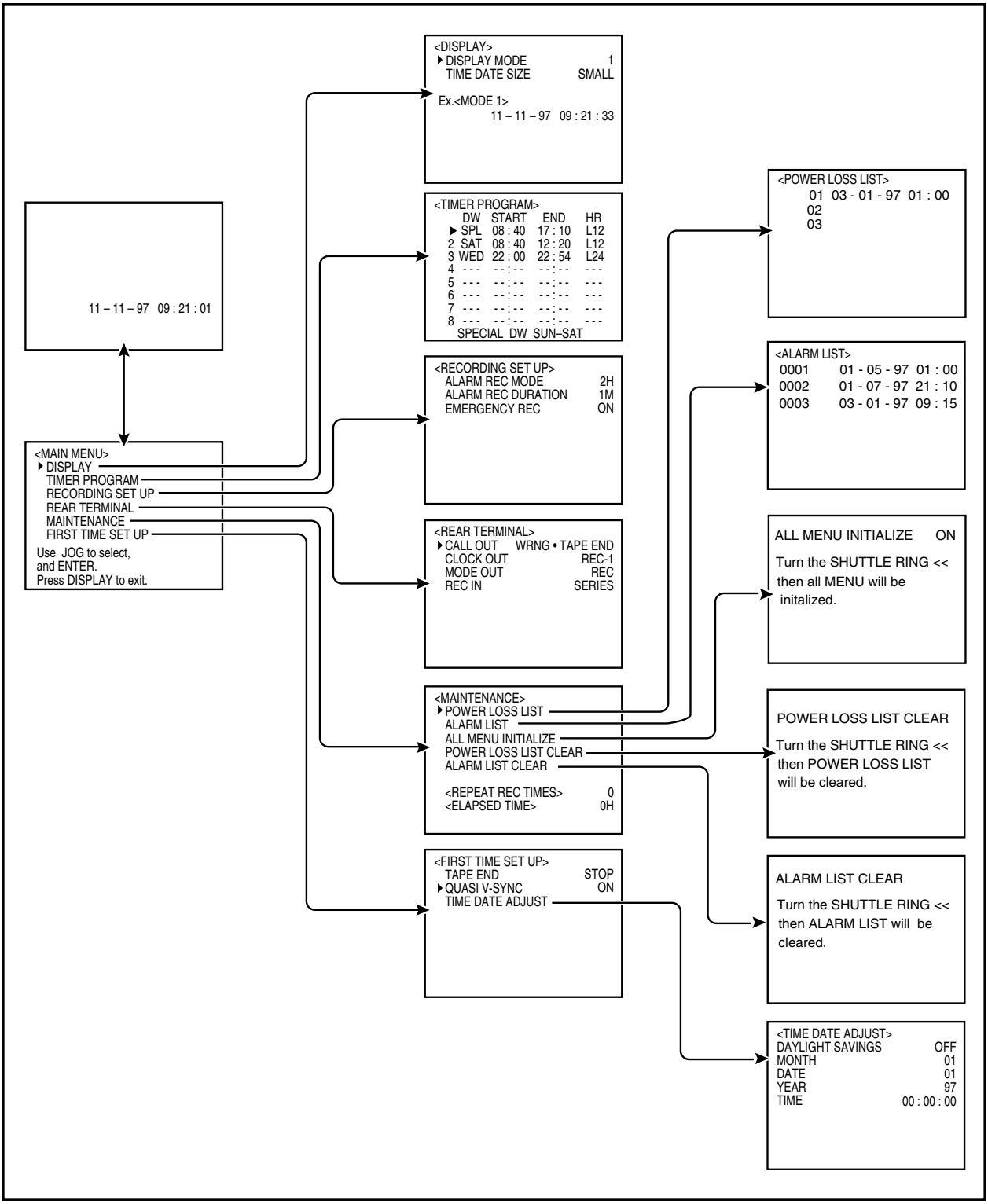


Figure 6. Menu Tree

6.3 MAIN MENU

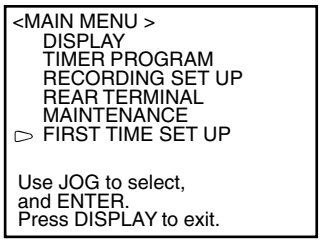


Figure 7. Main Menu

- DISPLAY
  Sets the time/date and direction to search for a desired location on a tape.
- TIMER PROGRAM
  Sets the timed recordings.
- RECORDING SET UP
  Sets the alarm recording mode, alarm recording duration, and emergency recording.
- REAR TERMINAL
  Sets the number of frames or fields to record for CLK OUT, output signal of CALL OUT terminal, and the MODE OUT terminal, etc.
- MAINTENANCE
  Displays the power loss list and alarm list, etc. Initializes all menu settings. Clears the power loss list and alarm list.
- FIRST TIME SET UP
  Sets quasi v-sync, time/date, and VCR operation when the end of the tape is reached.

6.4 DISPLAY MENU

6.4.1 Display Mode

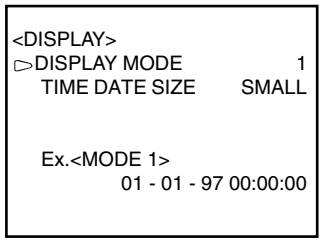


Figure 8. Display Menu

This is where you set the display mode. (Set the current date and time in the First Time Set Up menu. Refer to Section 6.9.2.)

DISPLAY MODE 1 Displays date and time.

DISPLAY MODE 2 Displays date, day of the week, present time, and recording mode.

DISPLAY MODE 3 Displays nothing until an alarm recording starts—then date, alarm recording number, etc. is displayed.

DISPLAY MODE 4 Displays nothing. Even in the case of alarm recording nothing is displayed on the monitor.

During an alarm recording, the alarm recording number is displayed if the display mode is set from 1 to 3.

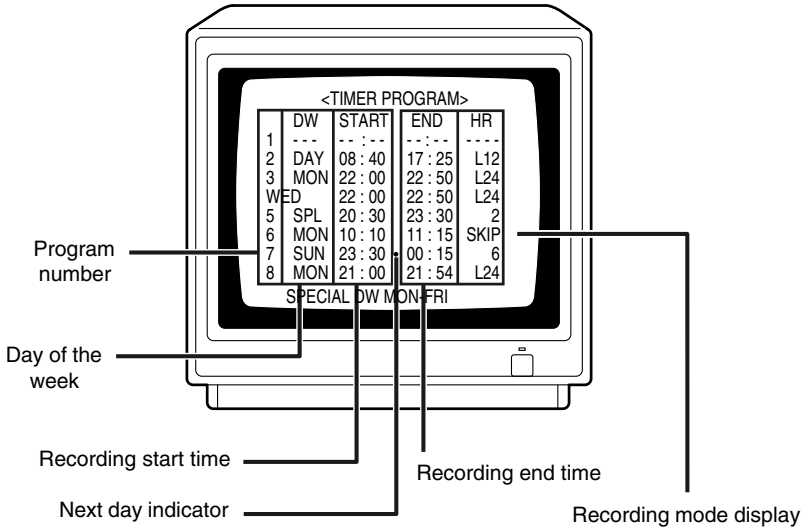
6.4.2 Time Date Size

This is where you set the size of the letters in the day and time display.

SMALL The letters become small.

LARGE The letters become large.

6.5 TIMER PROGRAM MENU


<TIMER PROGRAM>
DW START END HR
1 --- -- : -- --:-- ----
2 DAY 08 : 40 17 : 25 L12
3 MON 22 : 00 22 : 50 L24
WED 22 : 00 22 : 50 L24
5 SPL 20 : 30 23 : 30 2
6 MON 10 : 10 11 : 15 SKIP
7 SUN 23 : 30 00 : 15 6
8 MON 21 : 00 21 : 54 L24
SPECIAL DW MON-FRI
Program number
Day of the week
Recording start time
Next day indicator
Recording end time
Recording mode display

(program number)	This number identifies the program. If the recording times of two programs overlap, the higher program number has priority.
DW	Day of the week. DAY is used to record at the same time every day. SPL (special) uses the start/end days selected with SPECIAL DW at the bottom of the screen.
START/END	The VCR uses a 24-hour display. 00:00 indicates midnight; 12:00, noon; and 15:00, 3 p.m.
HR	This is the recording mode. SKIP indicates that timer recording is not performed during the set period. In 2H, 6H, L12H, and L24H mode, audio is also recorded.

Figure 9. Timer Program Illustration

6.6 RECORDING SET UP MENU

<RECORDING SET UP>

▷ALARM REC MODE 2H
ALARM REC DURATION 1M
EMERGENCY REC OFF

Figure 10. Recording Set Up Menu

NOTE: Set the ALARM REC DURATION to MAN2 to use with the MX4000 Series Genex™ Multiplexer.

NOTE: When using the MX4000 Series Genex™ Multiplexer, make sure the EMERGENCY REC setting is ON if the VCR is to record alarms only.

ALARM REC MOD Sets the alarm recording mode. When you turn the JOG dial, the display switches in the following order: 2H, 6H, L12H, L24H, 2H. (Refer to Section 8.3.3 for programming instructions.)

ALARM REC DURATION Sets the length of the alarm recording period. When you turn the JOG dial, the display switches in the following order: 1M (minute), 2M, 5M, 10M, MAN1, MAN2, 15S (second), 30S, 45S, 1M. (Refer to Section 8.3.3 for programming instructions.)

EMERGENCY REC Sets the emergency recording mode, as follows:

- OFF – Starts alarm recording when the alarm signal is received during recording.
- ON – Starts alarm recording when the alarm signal is received, not only during recording but also when the power is OFF or when the tape is stopped.

(Refer to Section 8.3.3 for programming instructions.)

6.7 REAR TERMINAL MENU

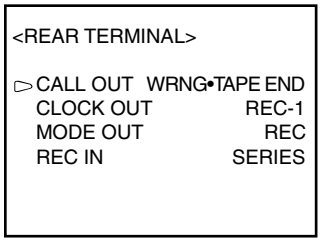


Figure 11. Rear Terminal Menu

CALL OUT

Sets the call signal output at the end of the tape. Turns on or off the signal that comes from the CALL terminal when the end of the tape is reached during recording. If any problems occur during recording, a call signal is output from the CALL terminal on the rear panel regardless of the CALL OUT setting.

- WRNG•TAPE END – A signal is output at the end of the tape or when a malfunction occurs.
- WRNG – When a malfunction occurs in the VCR during recording, a call signal is output.

CALL OUT is used in conjunction with TAPE END (First Time Set Up menu) to determine when the call signal is output, as shown in Table A.

CLOCK OUT

Sets the number of frames or fields to record (depending on the recording mode) at the CLOCK OUT terminal.

1. First, set the recording mode for the CLOCK OUT pulse output in the Rear Terminal menu.
   - REC – When recording in any mode.
   - T/L REC – When recording in time-lapse mode (L12, L24H).
2. Second, select the frequency interval by turning the SHUTTLE ring. when you turn the JOG dial, the display switches in the following order: 1, 2, 3, 4, 5, 10, 15, 20, 25, 30, 50, 60, F (field), 1. The numbers from 1 to 60 indicate the number of frames in 2H or 6H recording mode or the number of fields in time-lapse recording mode. One frame consists of two fields. One field is selected when it is set to “F” (field).

Table A. Call Out/Tape End

TAPE END Setting \ CALL OUT setting		WRNG•TAPE END	WRNG
STOP		Outputs a call signal at the end of the tape.	When a malfunction occurs in the VCR during recording, a call signal is output.
REWIND		Outputs a call signal at the end of the tape for 2 seconds.	(same as above)
REPEAT		(same as above)	(same as above)
ALARM •PROT	When there are alarm recordings during recording	(same as above)	(same as above)
	When there are no alarm recordings during recording	Outputs a call signal at the end of the tape.	(same as above)

MODE OUT Sets the state in which the signal output at the MODE OUT terminal is switched to active. When you turn the JOG dial, the display switches in the following order: REC (recording), PLAY (playback), POWER (power on), TAPE IN (tape inserted), TAPE REMAIN (three minutes in 2H mode before the tape ends), CLOCK ADJ (output the signal for one second when the clock indicates 00[min]:00[sec]), REC.

REC IN Sets the REC IN terminal's operation mode.

- SERIES – Recording starts when the REC IN terminal is short-circuited to ground or a low-level voltage (0 to +1.6V) is applied.
- REC-START/STOP – Recording starts when the REC IN terminal is short-circuited to ground or a low-level voltage (0 to +1.6V) is applied. Recording stops if this connection is removed.

6.8 MAINTENANCE MENU

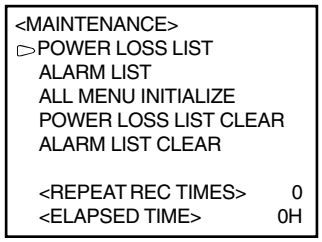


Figure 12. Maintenance Menu

POWER LOSS LIST To display the power loss list, turn the JOG dial to select POWER LOSS LIST. Turn the SHUTTLE ring to the right to display the list. Power failure start times are stored in memory, so you can confirm when they occurred. Up to three power failure start times will be displayed. If there were more than three, the first and last two power failure start times will be displayed.

ALARM LIST To display the alarm list, turn the JOG dial to select ALARM LIST. Turn the SHUTTLE ring to the right to display the list. Alarm record start times are stored in memory, so you can confirm when they occurred. Up to three alarm record start times will be displayed. If there were more than three, the first and last two alarm record start times will be displayed.

ALL MENU INITIALIZE Turn the SHUTTLE ring to the right and the words ALL MENU INITIALIZE will be displayed. When you turn the SHUTTLE ring to the left, all settings (except the TIMER RECORDING setting) will be cleared. Turn the SHUTTLE ring to the right to return to the Maintenance menu.

POWER LOSS LIST CLEAR Turn the SHUTTLE ring to the right and the words POWER LOSS LIST CLEAR will be displayed. When you turn the SHUTTLE ring to the left, the list will be cleared. Turn the SHUTTLE ring to the right to return to the Maintenance menu.

ALARM LIST CLEAR Turn the SHUTTLE ring to the right and the words ALARM LIST CLEAR will be displayed. When you turn the SHUTTLE ring to the left, the list will be cleared. Turn the SHUTTLE ring to the right to return to the Maintenance menu.

6.9 FIRST TIME SET UP MENU

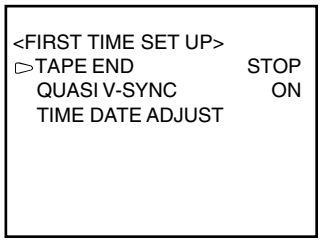


Figure 13. First Time Set Up Menu

TAPE END Sets the VCR's state of operation when the tape runs out during recording.

- STOP – The tape stops. "End" appears on the fluorescent display and "Tape End" on the monitor. When CALL OUT is set to WRNG•TAPE END, a call signal is output from the CALL terminal.
- REWIND – Rewinds the tape to the beginning and stops (except during timer recording). When CALL OUT is set to WRNG•TAPE END, a call signal is output for two seconds from the CALL terminal.

- REPEAT – Rewinds the tape to the beginning and resumes recording.
- ALARM•PROT – (Alarm Protection) If alarm recordings are on the tape, then the tape stops. “End” appears on the fluorescent display and “Tape End” on the monitor. When CALL OUT is set to WRNG•TAPE END, a call signal is output from the CALL terminal. If there are no alarm recordings, the tape is rewound and recording continues.

QUASI V-SYNC Sets Quasi V-Sync on or off.

- ON – Quasi V-Sync signal is inserted on the video output signal when in the special playback modes (still, slow motion, reverse, fast playback, speed search) and during normal playback in L12H, 12H, L24H, or 24H modes.
- OFF – Quasi V-Sync signal is not inserted.

NOTE: Some multiplexers may require Quasi V-Sync OFF to work properly. With the Pelco MX4000 Series Genex™ Multiplexer, setting Quasi V-Sync on or off has no apparent effect on playback.

TIME DATE ADJUST Sets the time, date, and Daylight Savings setting. Section 6.9.1 provides an explanation while Section 6.9.2 provides a procedure.

6.9.1 Day and Time Display Modes

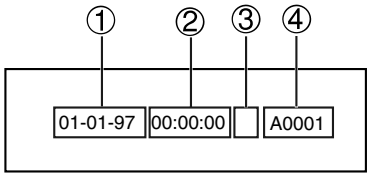


Figure 14. Display Mode 1

DISPLAY MODE 1

1. Month-Day-Year
2. Hour:Minute:Second
3. Daylight Savings Time symbol or power failure symbol
4. Alarm recording number
   - A 24-hour display is used: 00:00 indicates midnight; 12:00, noon; and 15:00, 3 p.m.
   - An alarm recording number is displayed during alarm recording.

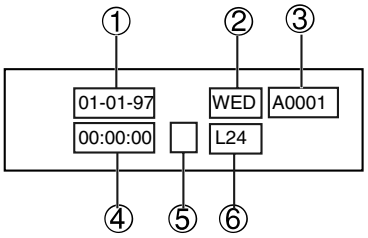


Figure 15. Display Mode 2

DISPLAY MODE 2

1. Month-Day-Year
2. Day of the week
3. Alarm recording number
4. Hour:Minute:Second
5. Daylight Savings Time symbol or power failure symbol
6. Recording mode
   - A 24-hour display is used: 00:00 indicates midnight; 12:00, noon; and 15:00, 3 p.m.
   - The day of the week is automatically set.
   - An alarm recording number is displayed during alarm recording.

6.9.2 Set the Day and Time

<MAIN MENU >
▷ DISPLAY
TIMER PROGRAM
RECORDING SET UP
REAR TERMINAL
MAINTENANCE
FIRST TIME SET UP

Use JOG to select,
and ENTER.
Press DISPLAY to exit.

1. Press the DISPLAY button to display the Main menu on the monitor.

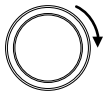
<MAIN MENU >
DISPLAY
TIMER PROGRAM
RECORDING SET UP
REAR TERMINAL
MAINTENANCE
▷ FIRST TIME SET UP

Use JOG to select,
and ENTER.
Press DISPLAY to exit.

2. Turn the JOG dial to select FIRST TIME SET UP.

<FIRST TIME SET UP >
▷ TAPE END STOP
QUASI V-SYNC ON
TIME DATE ADJUST

3. Turn the SHUTTLE ring to the right. The First Time Set Up menu will appear.

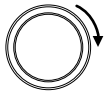


<FIRST TIME SET UP >
TAPE END STOP
QUASI V-SYNC ON
▷ TIME DATE ADJUST

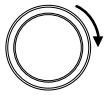
4. Turn the JOG dial to select TIME DATE ADJUST.

<TIME DATE ADJUST >
DAYLIGHT SAVINGS OFF
MONTH 01
DATE 01
YEAR 97
TIME 00:00:00

5. Turn the SHUTTLE ring to the right. The Time Date Adjust menu will appear.



6. Do the following to advance the clock by one hour and set Daylight Savings to ON:



Turn the SHUTTLE ring to the right. The DAYLIGHT SAVINGS display will flash. Turn the JOG dial to select ON.

- The clock advances by one hour and the Daylight Savings Time symbol (☼) will be displayed next to the present time display.
- To cancel Daylight Savings Time, switch DAYLIGHT SAVINGS to OFF.

<TIME DATE ADJUST >
DAYLIGHT SAVINGS OFF
MONTH 01
DATE 01
YEAR 97
TIME 00:00:00

NOTE: If power goes out while Daylight Savings Time is selected, the power failure mark "X" will replace the Daylight Savings Time symbol. When the power failure mark "X" disappears, the Daylight Savings Time symbol (☼) will reappear.

<TIME DATE ADJUST >
DAYLIGHT SAVINGS OFF
MONTH 01
DATE 01
YEAR 97
TIME 00:00:00

<TIME DATE ADJUST >
DAYLIGHT SAVINGS OFF
MONTH 01
DATE 01
YEAR 97
TIME 00:00:00

<TIME DATE ADJUST >
DAYLIGHT SAVINGS OFF
MONTH 08
DATE 01
YEAR 97
TIME 00:00:00

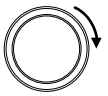
<TIME DATE ADJUST >
DAYLIGHT SAVINGS OFF
MONTH 08
DATE 01
YEAR 97
TIME 00:00:00

<TIME DATE ADJUST >
DAYLIGHT SAVINGS OFF
MONTH 08
DATE 05
YEAR 97
TIME 00:00:00

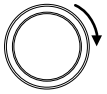
<TIME DATE ADJUST >
DAYLIGHT SAVINGS OFF
MONTH 08
DATE 05
YEAR 97
TIME 00:00:00

<TIME DATE ADJUST >
DAYLIGHT SAVINGS OFF
MONTH 08
DATE 05
YEAR 99
TIME 00:00:00

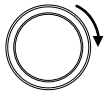
7. To set the month, turn the SHUTTLE ring to the right. The month display will flash. Turn the JOG dial to the right to set the MONTH.



8. To set the date, turn the SHUTTLE ring to the right. The date display will flash. Turn the JOG dial to the right to set the DATE.



9. To set the year, turn the SHUTTLE ring to the right. The year display will flash. Turn the JOG dial to the right to set the YEAR. The year digits can be set from 97 (for year 1997) to 27 (for 2027).



10. To set the time, turn the SHUTTLE ring to the right. The hour digits of the time display will flash. Turn the JOG dial to the right to set the hour digits. Set the minute digits in a similar fashion.

    To set the time to the exact second, do the following. When you set the minute digits, the digit on the right will flash and the seconds digits stay at 00. Turn the SHUTTLE ring to the right when the time signal reaches 00 seconds of the time you set. The time will begin counting from 00.

11. Turn the SHUTTLE ring to the right if you did not already do so in step 10. Programming is now complete.

12. Press the DISPLAY button. The time display will appear.

NOTE: The POWER button will not operate if any menu display is flashing.

7.0 LOADING/UNLOADING/PROTECTING THE TAPE CASSETTE

You can load video cassette tapes into your VCR as long as it is plugged into a power source. Loading a cassette automatically turns the VCR on even if its power switch is turned off. Use only video cassette tapes marked VHS.

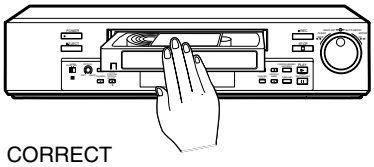
Use only standard grade VHS cassette tapes for reliable video recording. Do not use Pro, Hi-Fi, and High Grade tapes–they may damage the video heads. Use only T-120 or T-160 tapes.

7.1 LOADING

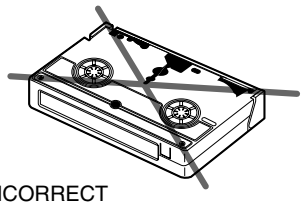
NOTE: The VCR's protection circuit will eject the tape if it is loaded improperly. If the VCR ejects the tape you are trying to load, remove it and check that the contents label is facing you and the clear plastic window showing the tape faces up. Try again.

1. To position the cassette properly before inserting it in the cassette slot, hold the cassette so the long narrow edge with the contents label faces you. The hinged narrow edge should face the VCR. The clear plastic window showing the tape should face up.

2. Line up the cassette squarely with the cassette slot and gently push the video tape in until the VCR pulls it in.



CORRECT



INCORRECT

7.2 UNLOADING

NOTE: The VCR will eject a video cassette even if it is in STANDBY mode. When you press the EJECT button, the VCR will automatically turn on, eject the tape, and turn off. You cannot eject a tape while recording without first pressing the STOP button, or while the VCR is locked.

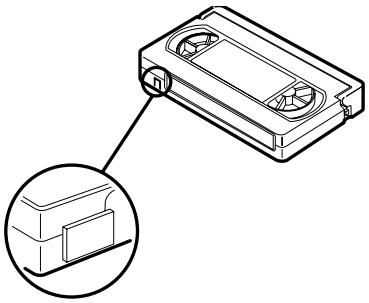
1. Press the EJECT button on the front of the VCR.

2. Remove the cassette.

7.3 PREVENTING ACCIDENTAL ERASURE

NOTE: We recommend taking any torn or broken cassette tape requiring repair only to professionals who specialize in such procedures. The adhesives on many common types of tape could damage the head on the VCR.

Video cassettes come with an erasure prevention tab. When it is removed it stops the tape's contents from being erased or recorded over. The VCR will automatically eject a cassette if you try to record over it with the erasure prevention tab removed.



8.0 RECORDING

8.1 MANUAL RECORDING

NOTES:

- *Press the PAUSE/SHUTTLE HOLD button to momentarily stop recording. Press the button again to resume recording.*
- *To protect the tape, the pause mode is automatically released after about five minutes.*
- *The REC button will not function unless the tape is in the stop or pause mode.*
- *If the cassette you insert in the VCR has the erasure prevention tab removed, the VCR will automatically eject it if you try to record on it.*
- *A tape recorded on this VCR can be played back correctly on another VCR.*

1. Load a cassette with the erasure prevention tab intact.
2. Press the REC/PLAY MODE buttons (+/-) to select the desired recording mode.
3. Use the VIDEO switch to pick either color or black and white (B/W) recording. (Do not connect color and black and white cameras together.)
4. To record the day and present time, display the day and present time on the monitor. (If you are not using a switcher and the time/date do not appear on the monitor and you want them to be recorded on the tape, you must turn them on using the VCR's menu system. If you already have time/date supplied by a switcher, you will probably not want them turned on via the VCR's menu.)
5. Press the REC button to begin recording.
6. Press the STOP button to stop recording.

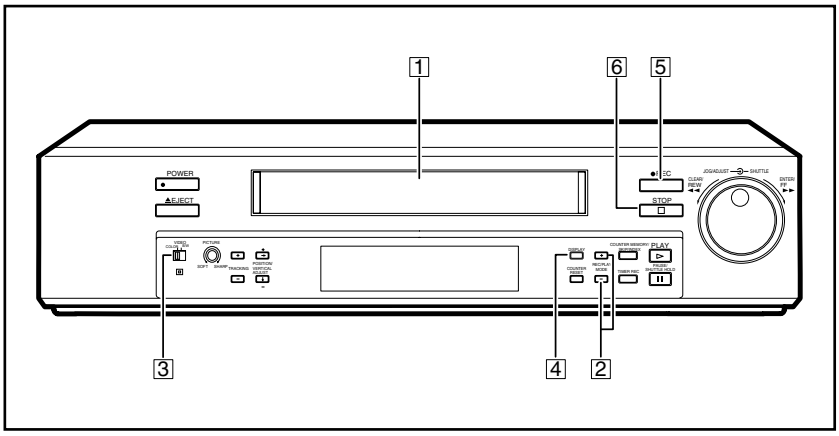


Figure 16. Manual Recording Steps

8.1.1 Recording Mode

Pressing the REC/PLAY MODE button switches the recording mode in the following order: 2H, 6H, L12H, L24H, 2H.

In recording mode, the VCR indicates the recording time with a T-120 cassette. Table B shows recording times with T-120 and T-160 cassettes.

Table B. Recording Times in Hours

	2H	6H	L12H	L24H
T-120	2 hrs.	6 hrs.	14 hrs.	26 hrs.
T-160	2 hrs. 40 min.	8 hrs.	18 hrs. 40 min.	34 hrs. 40 min.

8.1.2 Record Check Function

When the VCR is recording, press the PLAY button for more than 1.5 seconds and then release. The tape rewinds a little and then plays back the recording just made. When the tape reaches the spot where you pressed the PLAY button, the VCR returns to record mode.

8.1.3 Audio Recording

Apply the specified line input signal to the AUDIO IN connector.

Normal sound is played back only when a tape recorded in 2H, 6H, L12H, or L24H mode is played back in its respective mode.

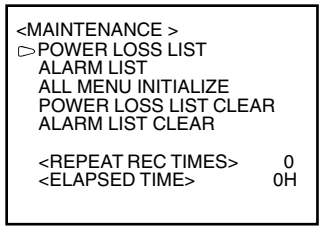
The longer the recording time mode, the worse the sound quality becomes. In L24H mode, the sound quality is such that speech can be heard.

8.1.4 Repeat Recording

When TAPE END on the First Time Set Up menu is set to REPEAT or ALARM•PROT and the repeat recording mode is set (the REPEAT indicator is lit), the tape will automatically rewind to the start when the end of the tape is reached. Recording will begin again.

Table C shows what automatically happens when the tape ends during recording.

8.1.4.1 Number of Tape Uses (Repeat Recording Times)



Displays the number of times a tape has been used when the TAPE END setting is set to REWIND, REPEAT, or ALARM•PROT.

1. Press the DISPLAY button. The Main menu will appear.
2. Turn the JOG dial to select MAINTENANCE and turn the SHUTTLE ring to the right. MAINTENANCE will appear on the display. REPEAT REC TIMES indicates how many times a tape has been recorded on.
   - The number of tape uses increments by one when the tape ends.
   - The number of tapes uses is kept even if the AC power is disconnected, provided the backup battery is fully charged.
   - The number of tapes uses is reset when you replace the current tape with another.
3. Press the DISPLAY button. The time will be displayed.

Table C. When Tape End is Reached

	STOP	REWIND	REPEAT	ALARM•PROT
When there are alarm recordings on tape.	The tape stops.	The tape automatically rewinds to the beginning and then stops.	The tape automatically rewinds to the beginning and recording resumes.	The tape stops.
When there are no alarm recordings on tape.				The tape automatically rewinds to the beginning and recording resumes.

NOTE: On ALARM•PROT mode, a tape with alarm recordings can be used for repeat recording by ejecting and re-inserting the tape.

8.1.4.2 Recommended Number of Tape Uses

Video tape wears during use. Use a new cassette according to the following table.

Table D. Recommended Number Of Tape Uses

Recording Time Mode	Number Of Repeat Tape Uses	
	T-120 Cassette	T-160 Cassette
2H	100	50
6H	100	50
L12H	60	30
L24H	35	17

8.1.5 Series Recording

You can do series recording by connecting two or more TLR2024 VCRs together. When the tape in the first VCR reaches the end during recording, the tape in the second VCR automatically begins recording.

1. Set REC IN on the Rear Terminal menu to SERIES.
2. Set CALL OUT on the Rear Terminal menu to WRNG•TAPE END.
3. Set TAPE END on the First Time Set Up menu to REWIND.

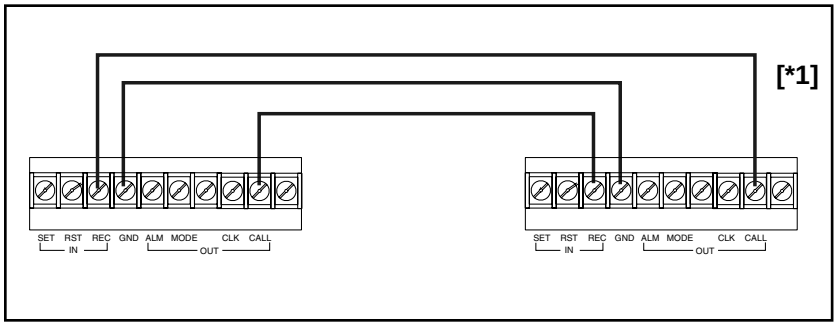


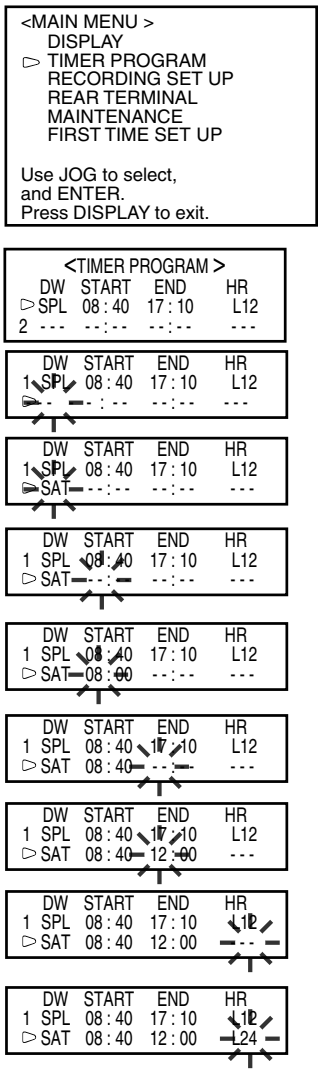
Figure 17. Connecting VCRs in Series

NOTES:

- *Series recording may have a short pause (up to five seconds) when going from recorder A to recorder B. However, if you set CALL OUT in the Rear Terminal menu to WRNG•REMAIN, this delay is eliminated.*
- *When set in the above configuration and the second VCR reaches the end of the tape, the first VCR automatically begins recording. Connect the line marked by [*1] in Figure 17 only if you want the first VCR to begin recording again. If not, do not connect it.*
- *If a problem occurs (for example, the motor malfunctions during recording) in the first VCR, the second VCR automatically begins recording.*
- *Series recording will not work during timer recording.*
- *When recording in series, set CALL OUT in the Rear Terminal menu to a mode other than WRNG.*

8.2 TIMER RECORDING

8.2.1 Programming Procedure



1. Press the DISPLAY button to display the Main menu on the monitor.
2. Turn the JOG dial to select TIMER PROGRAM and turn the SHUTTLE ring to the right. The TIMER PROGRAM display will appear.
3. Turn the JOG dial to select the program number and turn the SHUTTLE ring to the right. The day of the week display flashes.
4. To set the day of the week (DW), turn the JOG dial to select the day and turn the SHUTTLE ring to the right.
5. To set the START recording time, turn the SHUTTLE ring to select the recording start time display. Turn the JOG dial to set the recording start time.
6. To set the END recording time, turn the SHUTTLE ring to select the recording end time display. Turn the JOG dial to set the recording end time.
7. To set the recording mode (HR), turn the SHUTTLE ring to select the recording mode display. Turn the JOG dial to set the recording mode.
8. Turn the SHUTTLE ring to the right. The display stops flashing. If the program has not been completely set, the flashing will not stop.
   - If the END time is the same or earlier than the START time, the next day indicator (•) is automatically displayed. This indicates the recording will run continuously from the START time on the first day to the END time on the next day.
   - When setting another program, turn the SHUTTLE ring to set and repeat steps 3-8. You can schedule eight programs maximum.
   - To erase the program setting, select the program number to be erased. Turn the SHUTTLE ring to the right to flash the day of the week, then turn the SHUTTLE ring to the left.
9. Press the DISPLAY button to show the day and time on the monitor.
10. Press the TIMER REC button. The TIMER REC indicator will light.

8.2.2 Special DW Settings

Set the recording period by specifying the start and end day of the week for timer recording.

1. Access the TIMER PROGRAM setting display.
2. Turn the JOG dial to select SPECIAL DW and turn the SHUTTLE ring to the right.
3. Turn the JOG dial to set the start day and turn the SHUTTLE ring to the right.
4. Turn the JOG dial to set the end day and turn the SHUTTLE ring to the right. The start and end day cannot be set to the same day.

8.2.3 Avoid Mistakes When Using the Timer

Refer to Table E if you get an error when pressing the TIMER REC button.

Table E. Timer Recording Troubleshooting

SYMPTOM	FAULT	ACTION
TIMER REC indicator flashes	• A tape is not inserted. • A tape is loaded with the erasure prevention tab removed. • Date, time, or timer recording time is not set. • A menu is being programmed.	1. A menu is being programmed. Press the TIMER REC button. 2. Correctly set the timer program. 3. Press the TIMER REC button and confirm the TIMER REC indicator (⏎) is illuminated.

8.3 ALARM RECORDING

You can switch from all recording modes to the 2H – L24H alarm recording mode by applying an alarm signal to the SET IN (alarm input) terminal on the rear panel.

- You can switch to alarm recording by applying the alarm input signal from the alarm sensor during recording in 2H, 6H, L12H, or L24H modes.
- Set the alarm recording mode and alarm recording period in the Recording Set Up menu. Refer to Section 6.6 for instructions.
- The index signal is automatically recorded when alarm recording begins (INDEX indicator flashes on the fluorescent display).
- To record the index signal, the first 15 seconds of the alarm recording are in 2H mode (in the case of recording in 2H, L12H, or L24H mode) or 6H (in the case of recording in 6H mode).
- If another alarm input signal is applied to the SET IN (alarm input) terminal while the index signal is being recorded (for 15 seconds), a new alarm recording will not be triggered.

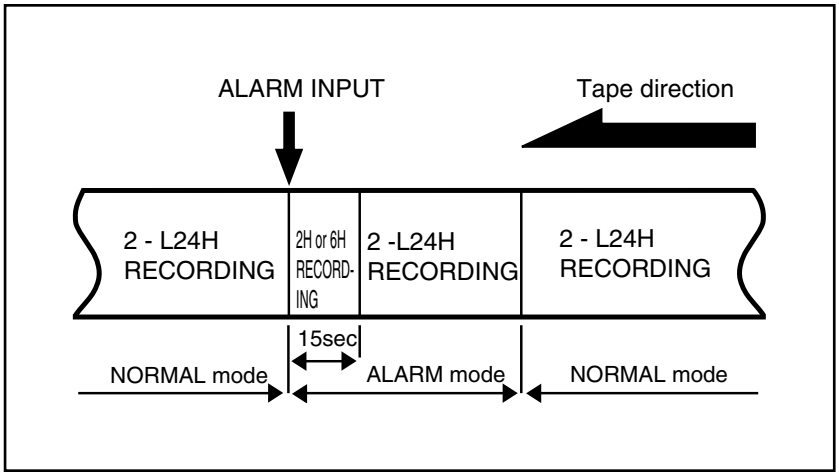


Figure 18. Switching from Normal to Alarm Mode and Back

8.3.1 Alarm Recording Connection

You can confirm an alarm from a distance by connecting the ALM (alarm) OUT terminal to an existing alarm system panel or other external device such as a buzzer.

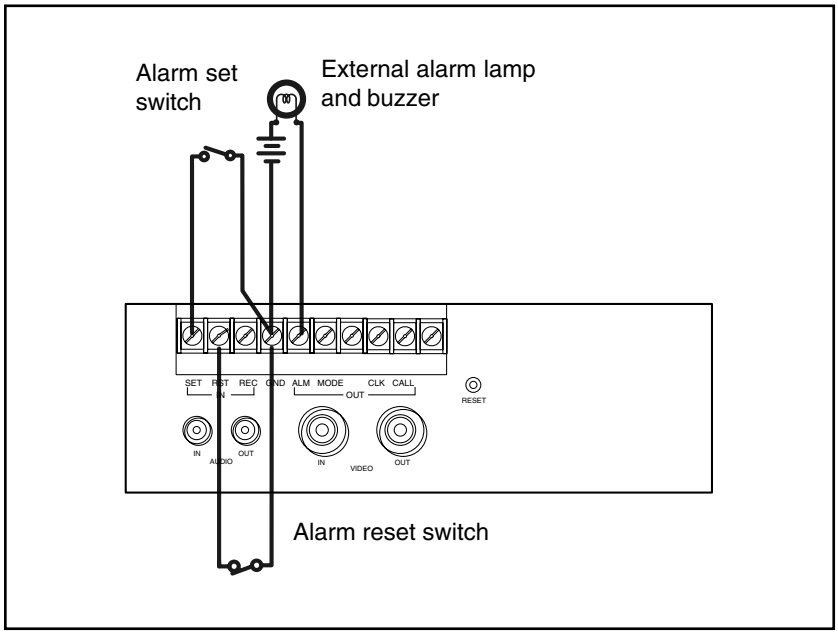


Figure 19. Alarm Recording Connection

8.3.2 External Time Clock Adjustment

If ALARM REC DURATION in the Recording Set Up menu is set to other than MAN1, the on-screen clock can be reset to the nearest hour by applying a signal to the RST (reset) IN terminal. For example, if the current time is 11:29:59, it will be reset to 11:00:00; and if the current time is 11:30:00, it will be reset to 12:00:00.

*1 If the MODE terminal of the first VCR is connected to the RST (reset) IN terminal of the second VCR and if MODE OUT in the Rear Terminal menu is set to CLOCK ADJ, the second VCR's on-screen clock will automatically be adjusted to that of the first VCR.

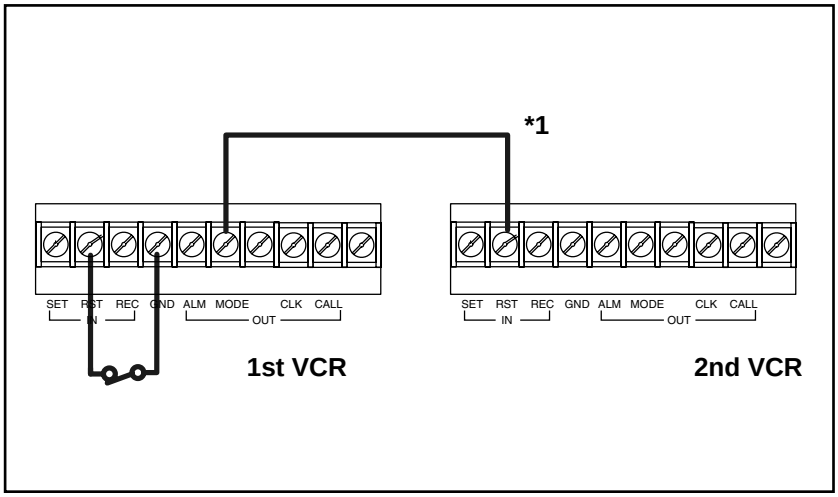
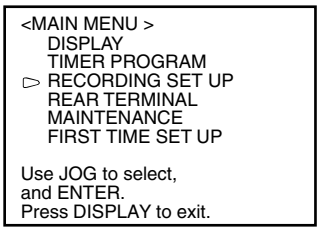


Figure 20. Time Clock Adjustment Connection

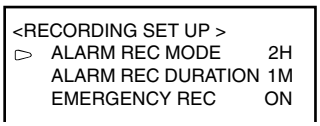
8.3.3 Programming for Alarm Recording

Alarm recording speeds up recording when the VCR is recording in one of the time-lapse modes. Alarm recording provides more pictures during the alarm. Emergency recording activates alarm recording even if the VCR is off, stopped, or in timer recording/standby. You should set the alarm recording mode in the Recording Set Up menu before using alarm recording.



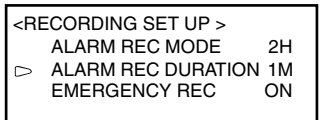
1. Press the DISPLAY button to display the Main menu.

2. Turn the JOG dial to select RECORDING SET UP and turn the SHUTTLE ring to the right. The Recording Set Up menu will appear.



3. Turn the JOG dial to select ALARM REC MODE and turn the SHUTTLE ring to the right.

4. Turn the JOG dial to set the alarm recording mode and turn the SHUTTLE ring to the right.



5. Turn the JOG dial to select ALARM REC DURATION and turn the SHUTTLE ring to the right.

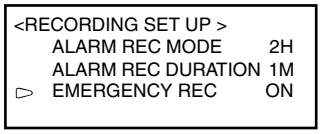
6. Turn the JOG dial to set the alarm recording duration from 15 seconds to 10 minutes, MAN1, or MAN2 (manual), during which alarm recording is to be executed when an alarm signal is received. Turn the SHUTTLE ring to the right.

   - If ALARM REC DURATION is set to MAN1, alarm recording will continue until a signal is received at the RST (reset) IN terminal. If that signal is within the first 15 seconds of alarm recording, alarm recording will continue for 15 seconds and then stop.

   - If ALARM REC DURATION is set to MAN2, alarm recording will continue until the signal received at the SET IN (alarm input) terminal is removed. If that signal is removed within15 seconds of the start of alarm recording, alarm recording will continue for 15 seconds and then stop.

   - The internal time clock can be adjusted if a signal is applied to the RST (reset) IN terminal when ALARM REC DURATION is set to other than MAN1.

7. Turn the JOG dial to select EMERGENCY REC and turn the SHUTTLE ring to the right. Turn the JOG dial to select ON.



8. Press the DISPLAY button. The time display will appear.

   During alarm recording, the alarm recording count will be displayed automatically except when Display Mode 4 is selected.

   - The alarm recording count display counts up to 9999 alarm recordings and then resets to 0000 and continues counting.

   - When initializing the alarm recording list, the alarm recording count display will be reset.

   - The alarm indicator flashes during alarm recording and lights steadily when the alarm recording finishes.

   - When the alarm recording finishes, the VCR resumes recording in the same mode as before the alarm recording.

   - If you are programming on any of the menus and an alarm input signal is received at the SET IN (alarm input) terminal, alarm recording will begin and the menu being programmed will disappear from the screen.

NOTES:

- *If an alarm input is received during alarm recording, a new alarm recording will start with the new input signal. If one alarm input signal is received within 15 seconds of another, the later alarm input signal will be ignored and a new alarm recording will not take place.*

- *Alarm recording will continue for the period set in the ALARM REC DURATION field, even if a timer recording has reached its end time.*

- *Alarm recording stops when the end of the tape is reached.*

8.3.4 Emergency Recording

Emergency alarm recording can start when an alarm is triggered even if the VCR is stopped or is programmed for timer recording.

1. Turn the JOG dial to select EMERGENCY REC and turn the SHUTTLE ring to the right.

2. Turn the JOG dial to select ON for emergency recording, or OFF to disable it.

EMGCY lights up on the fluorescent display when EMERGENCY REC in the Recording Set Up menu is set to ON.

8.3.5 Alarm Record Time Display

<ALARM LIST>
0001 02-10-97 06:30
0002 02-15-97 23:30
0003 02-28-97 17:30

When alarm recordings begin, the start times are stored in memory so you can confirm when they occurred. Select ALARM LIST in the Maintenance menu and the alarm list will be displayed.

Up to three alarm recording start times can be stored in memory. If there are more, then the first and last two will be displayed.

8.3.5.1 Reset the Alarm Recording List

1. Select ALARM LIST CLEAR in the Maintenance menu.

2. Turn the SHUTTLE ring to the right. ALARM LIST CLEAR will be displayed.

3. Turn the SHUTTLE ring to the left. The alarm list will be cleared.

8.4 RECORDING AFTER A POWER FAILURE

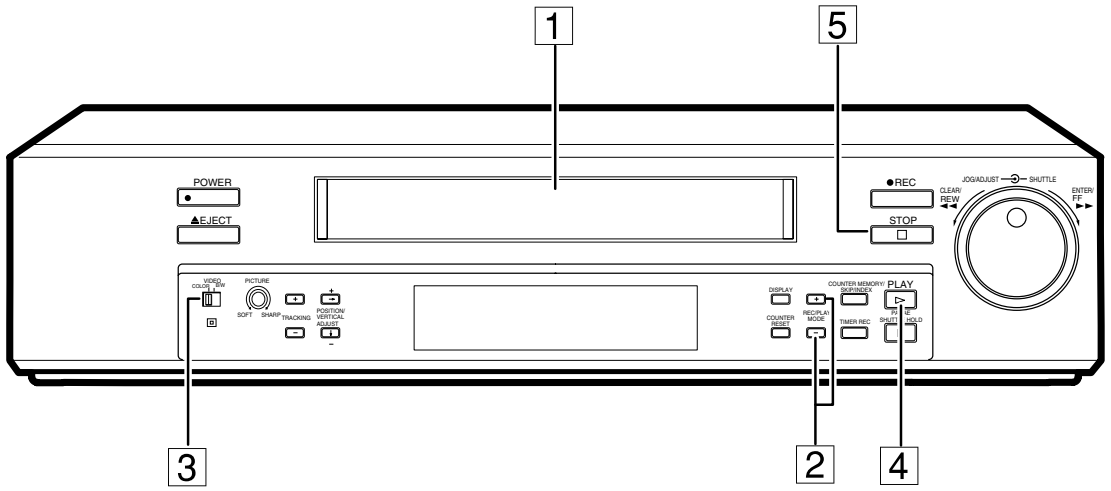
01-01-97 WED
00:00:00X L24

If there is a power failure during recording and the power comes back on, the VCR will begin recording in the same record mode as before the power failure. After the power comes back on, an “X” will be displayed next to the present time for about a minute.

If there is a power failure during playback, the VCR will be in stop mode when the power comes back on.

9.0 PLAYBACK

9.1 PLAYBACK PROCEDURE



1. Load a pre-recorded tape. (If the erasure prevention tab has been removed, the VCR automatically begins playback mode.)
2. Press the REC/PLAY MODE (+) or (-) buttons to select the desired playback mode.
   - A tape recorded in 2H, L12H, or L24H mode cannot be played back in 6H mode.
   - A tape recorded in 6H mode cannot be played back in 2H, L12H, 12H, L24H, or 24H mode.
3. Set the VIDEO switch to either COLOR or B/W.
4. Press the PLAY button to start playback.
5. Press the STOP button to halt playback.
   - Turn the SHUTTLE ring to the left to rewind the tape when the VCR is in stop mode.
   - Turn the SHUTTLE ring to the right to fast forward the tape when the VCR is in stop mode.

Figure 21. Playback Controls

9.1.1 Playback Mode

- When you press the REC/PLAY MODE button, playback mode is switched in the following order: 2H, L12H, 12H, L24H, 24H, 2H.
- If the recording is in 6H mode, playback mode is not switched even when you press the REC/PLAY MODE button.

9.1.2 Audio Playback

Modes with the letter "L" (L12H and L24H) are for audio recording and playback on the linear track.

Table F. Audio Playback Availability

Playback mode	2H	6H	L12H	12H	L24H	24H
Audio playback	Available	Available	Available	Not Available	Available	Available
Picture quality	Good	Good	Vibrating	Less Vibrating	Vibrating	Less Vibrating

NOTES:

- *There is normal sound playback only when a tape recorded in 2H – L24H modes is played back in its respective mode.*
- *If a recording is played back in a higher mode than that in which it was recorded, the picture is played back in slow motion. If played back in a lower mode than that in which it was recorded, the picture is played back in fast motion.*
- *The picture may move up/down or noise may occur when a tape is played back in L12H, 12H, L24H, or 24H mode (even if the tape was recorded in L12H or L24H mode).*

9.1.3 End of Tape

When the end of the tape is reached, the following functions are performed automatically during playback or fast forwarding.

Table G. End of Tape Actions

Tape End Selected	REPEAT or ALARM•PROT	STOP or REWIND
Playback	The tape automatically rewinds to the beginning and stops.	Stop
Fast Forward	Stop	Stop

9.2 SPECIAL EFFECTS PLAYBACK

The VCR features the following convenient functions. Audio output is muted during special effects playback.

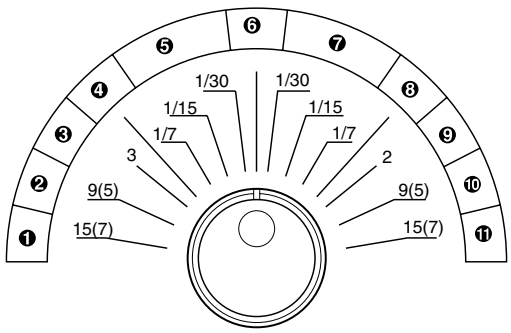
9.2.1 Shuttle Ring

You can adjust the playback speed using the SHUTTLE ring.

1. Press the PLAY button to begin playback.
2. Press the PAUSE/SHUTTLE HOLD button to get a still picture.
3. Turn the SHUTTLE ring to the appropriate angle for the playback speed you want.

NOTES:

- *Releasing the SHUTTLE ring returns it to the center position and resumes still mode.*
- *Pressing the PAUSE/SHUTTLE HOLD button while turning and holding the SHUTTLE ring (as in step 3) continues the playback speed you selected even though the SHUTTLE ring is released.*



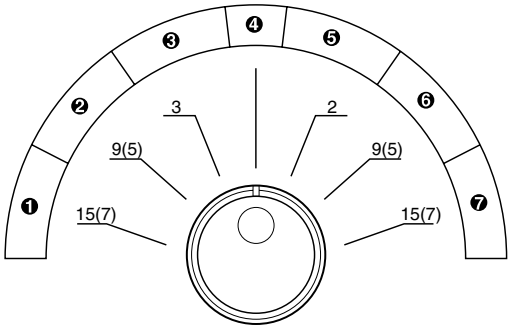
❶ Reverse high speed search
❷ Reverse speed search
❸ Reverse fast playback (x3)
❹ Reverse playback
❺ Reverse slow
❻ Still
❼ Slow playback
❽ Normal playback
❾ Fast playback (x2)
❿ Forward speed search
⓫ Forward high speed search

(x3 or x2) indicates the playback speed of the recorded tape in 2H mode.

Figure 22. Shuttle Ring Speed Settings

9.2.2 Direct Shuttle Ring

You can also change the playback speed without entering pause mode by turning the SHUTTLE ring during playback. Releasing the SHUTTLE ring returns it to the center position and resumes normal playback.



❶ Reverse high speed search
❷ Reverse speed search
❸ Reverse fast playback (x3)
❹ Normal playback
❺ Fast playback (x2)
❻ Forward speed search
❼ Forward high speed search

(x3 or x2) indicates the playback speed of the recorded tape in 2H mode.

Figure 23. Direct Shuttle Ring Speed Settings

9.2.3 Still Picture

NOTE: A few noise bars or vertical movement may appear during still playback.

You can get a still picture by pressing the PAUSE/SHUTTLE HOLD button during playback. Press it again to resume playback.

9.2.4 Frame-by-Frame Playback

NOTES:
- *Noise bars may appear on the picture when switching between forward and reverse playback.*
- *A few noise bars or vertical movement may appear during frame-by-frame playback.*

You can use the JOG dial to advance the tape frame by frame.

1. While the VCR is playing the tape, press the PAUSE/SHUTTLE HOLD button to freeze the picture.
2. Rotate the JOG dial clockwise to advance the tape, or counterclockwise to reverse the tape. To get a continuous frame-by-frame picture, keep rotating the JOG dial.
3. Press the PLAY button to resume normal playback.

9.3 LOCATING THE START OF ALARM RECORDINGS

The VCR automatically inserts an index signal at the beginning of each alarm recording, so the start of each alarm can be located.

9.3.1 Index Search

During fast forward or rewind, the VCR will search for alarm index signals. When it finds one, it plays back the tape and stays in still mode.

1. Press the COUNTER MEMORY/SKIP/INDEX button to illuminate INDEX on the fluorescent display. The number indicator will also be illuminated.
2. Turn the JOG dial to display the number (1-15) corresponding to the alarm index you want to find.
3. Turn the SHUTTLE ring to the right (forward direction) or left (reverse direction). The index number will decrease as each index signal passes. (The index signal may be hard to find in some recording conditions.)

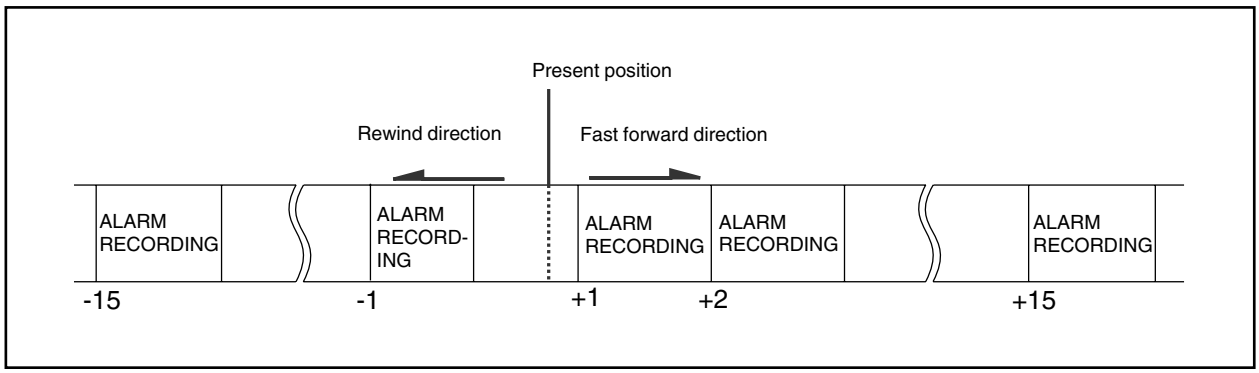


Figure 24. Index Searching

9.3.2 Skip Search

The VCR will fast forward or rewind until it finds an index signal. It then plays back for about four seconds in 2H or 6H mode. It repeats this process until reaching the end or beginning of the tape.

1. Press the COUNTER MEMORY/SKIP/INDEX button to illuminate SKIP on the fluorescent display.
2. Turn the SHUTTLE ring to the right or left.
3. Until it finds the index signal, the VCR will fast forward (or rewind). When it finds the index signal, the VCR plays back (at 2H or 6H mode) for about four seconds. It repeats this process until the end or the beginning of the tape is reached.
4. Press the PLAY button when the desired location is found. Or, press the STOP button to end the skip search.

   The index signal may be hard to find in some recording conditions.

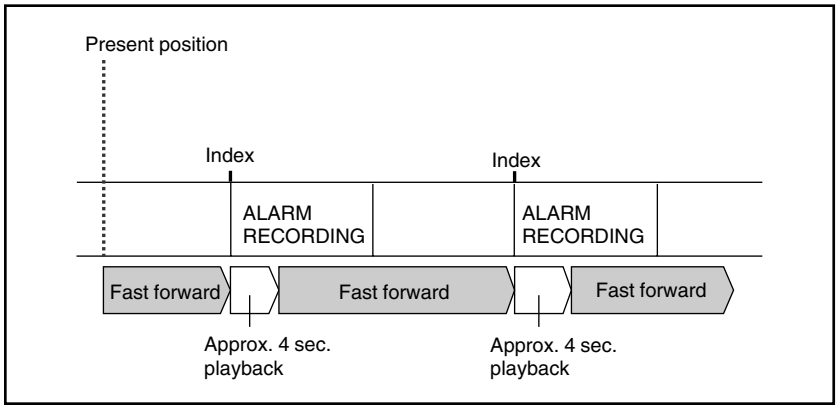


Figure 25. Skip Searching

9.4 ADJUSTMENT DURING PLAYBACK

9.4.1 Tracking Adjustment

NOTES:
- *Noise bars may appear when in reverse playback or reverse slow mode.*
- *Noise bars will move continuously through the picture when pressing and holding a TRACKING button (except in L12H or L24H mode).*
- *Noise bars will move through the picture each time a TRACKING button is pressed in L12H or L24H playback mode.*

If noise appears in the picture during playback, fast playback, reverse playback, or forward/reverse slow playback, adjust the TRACKING buttons (+/-) for the best picture.

Press the PAUSE/SHUTTLE HOLD button while turning and holding the SHUTTLE ring to adjust the tracking in fast playback, reverse playback, or forward/reverse slow playback.

To return tracking to its initial setting, press the TRACKING buttons at the same time during playback, reverse playback, or forward/reverse slow playback.

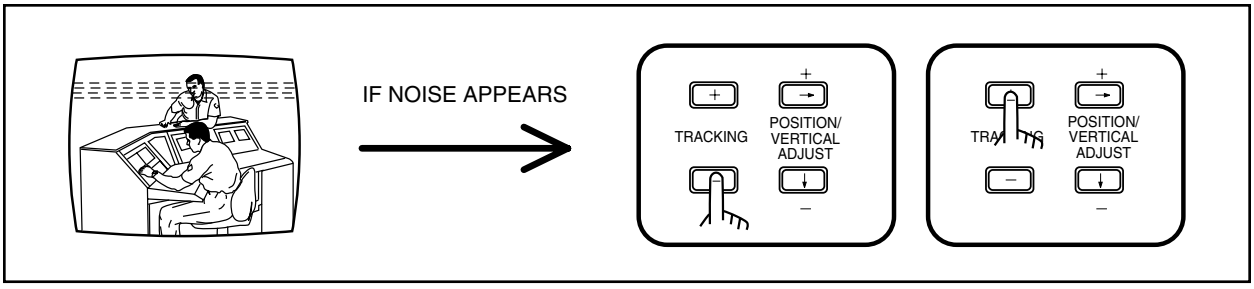


Figure 26. Tracking Adjustment

9.4.2 Picture Quality Adjustment

NOTE: This control is effective only during playback.

This control lets you adjust the playback picture so the outline is sharper or softer.

9.4.3 Vertical Adjustment

NOTES:

- *Horizontal vibration cannot be corrected with the VERTICAL ADJUST buttons.*
- *When you press the VERTICAL ADJUST buttons (+ or -) at the same time during still playback, it sets the vertical adjustment to the initial setting.*

The picture may vibrate when watching still, slow motion, fast playback, or normal playback in L12 or L24H mode. In this case, press the VERTICAL ADJUST buttons (+ or -) to reduce or eliminate picture vibration.

If this applies to all playback modes, then do the following:

1. Play a self-recorded 2H tape and press the PAUSE button.
2. Press the VERTICAL ADJUST buttons (+ or -) to reduce or eliminate picture vibration.

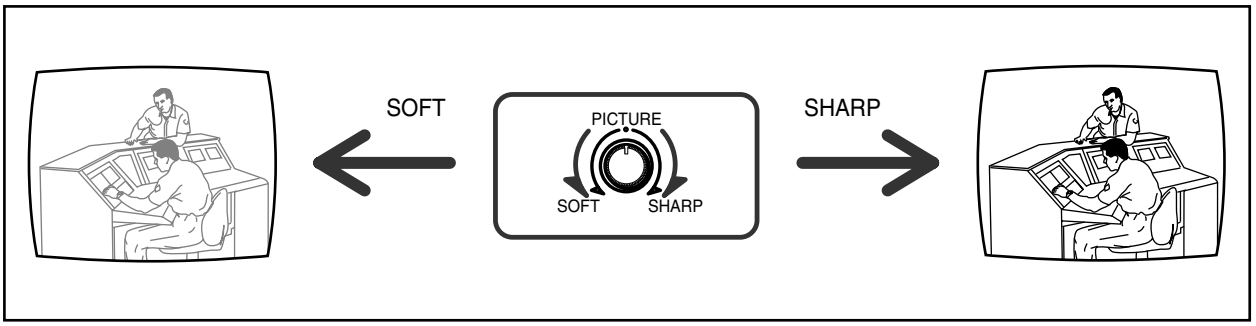


Figure 27. Picture Quality Adjustment

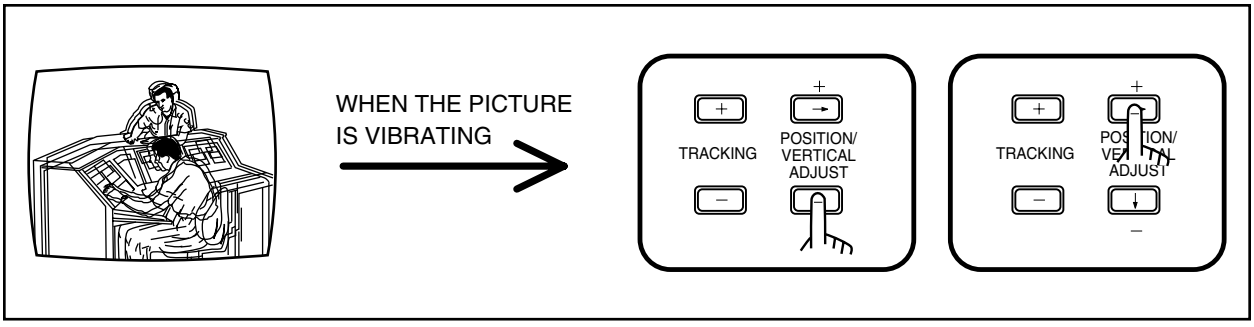


Figure 28. Vertical Picture Adjustment

10.0 ADDITIONAL FUNCTIONS AND FEATURES

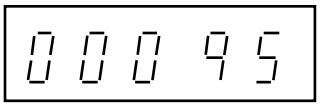
10.1 COUNTER

NOTE: The counter display is stored in the memory when the power is turned off, so the same numbers will be displayed when the power is restored.

10.1.1 Counter Memory

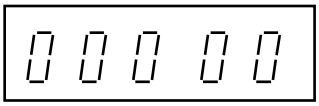
Press the COUNTER MEMORY/SKIP/INDEX button repeatedly until the “M” indicator appears on the fluorescent display. Turn the SHUTTLE ring to the right and the tape will rewind to the 00000 position of the counter and stop. (The rewind to 00000 is slightly inaccurate.)

10.1.2 Tape Counter



A five-digit counter indicates the relative position on the recorded portion of the tape. EEE EE illuminates to show VCR power is in standby mode.

10.1.3 Counter Reset



Press the COUNTER RESET button to reset the counter to 00000.

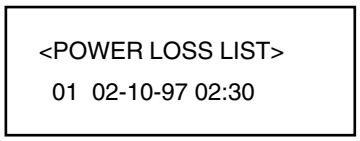
10.2 MEMORY BACKUP IN CASE OF POWER FAILURE

NOTE: The backup is for memory only–the VCR will not continue recording during a power outage unless connected to a UPS.

The VCR includes a built-in memory backup so the presets for time/date, alarm list, power loss list, and the number of tape uses will remain in memory if there is a power failure or if the power cord is disconnected from the AC outlet. Presets remain in memory for a maximum of 31 days provided the VCR has been connected to AC power for at least 40 hours per week. Connection charges the battery backup.

Check the time if there has been a power failure or if the power cord has been disconnected from AC power for a prolonged period.

10.3 POWER FAILURE TIME DISPLAY



Power failure start times are stored in memory, so you can confirm the start times.

1. Press the DISPLAY button to display the Main menu.
2. Turn the JOG dial to select MAINTENANCE and turn the SHUTTLE ring to the right. The Maintenance menu will appear.
3. Turn the JOG dial to select POWER LOSS LIST and turn the SHUTTLE ring to the right. POWER LOSS LIST will appear.

Up to three power failure start times will be displayed. If more than three failures occurred, the first and last two times will be displayed.

To reset the power loss list, select POWER LOSS LIST CLEAR in the Maintenance menu and turn the SHUTTLE ring to the right. The POWER LOSS LIST CLEAR screen will appear. Turn the SHUTTLE ring to the left.

10.4 ELAPSED TIME DISPLAY

<ELAPSED TIME> 1H

The elapsed time of recording and playback is stored in memory. Use the elapsed time as a guide for periodic replacement of parts.

1. Press the DISPLAY button to display the Main menu.
2. Turn the JOG dial to select MAINTENANCE and turn the SHUTTLE ring to the right. The elapsed time (counted up to 89,999 hours) is displayed.
3. Press the DISPLAY button. The time display will appear.

11.0 TESTING

11.1 INITIAL SYSTEM TESTING

Before using the newly-installed surveillance system, do the following:

- Make test recordings at the time-lapse speeds you will be using. Test how the system performs with alarms.
- Interrupt electrical power to check your installed power backup system (if applicable).
- On playback, verify picture quality and that you can see the time/date display under normal and alarm conditions.

11.2 REGULAR SYSTEM TESTING

Every day check that the system is operating. Is the REC indicator lit? does the COUNTER display indicate movement? Does the monitor show proper camera sequencing and time/date information?

Check for recorded alarms. Multiple alarms could make the tape run out early. Make sure there is enough tape to record at least five minutes of alarm activity at the selected speed.

Regularly verify picture quality and operation under normal and alarm conditions. Play a tape recorded recently under normal conditions, which also includes an alarm condition that you triggered manually.

Regularly replace tapes (refer to Table D for a schedule). Check tapes for head scarring. Replace damaged tapes. Always store tapes in their boxes; away from magnetic fields, heat, direct sunlight, and dust.

12.0 TROUBLESHOOTING

12.1 SELF-DIAGNOSTIC FUNCTION AND WARNING DISPLAY

The VCR uses self-diagnostics to detect internal malfunctions during recording. If one occurs, the VCR indicates it on the monitor and in the VCR's fluorescent display.

Table E shows the type of malfunction corresponding to the warning display and the action to take.

Table H. Warning Display and Actions

Fluorescent Display	Monitor	Cause	Remedy	To Turn Off the Indication
END	TAPE END	The tape ends during recording.	Rewind the tape and press the EJECT button.	Turn off the indication on the fluorescent display and on the screen by pressing the EJECT button or rewinding the tape.
—	NO SIGNAL	Lack of video signal input*.	Check for loose connections.	When a video signal is restored or record mode is cleared, the indication on the screen turns off.
—	CHECK	Tape/deck trouble.	First, check the cassette. If there seems to be nothing wrong with it, try recording again. If "CHECK" is still displayed, change the cassette with a new one and try recording again. Otherwise, unplug the power cord and contact the dealer.	

* Lack of video input signal.

If the VCR is set to record and it does not detect an input signal, NO SIGNAL appears on the monitor and the call signal is output from the rear terminal.

Check that the cable from the camera is not broken and camera's power has not been lost.

12.2 BEFORE CALLING FOR SERVICE

SYMPTOM	REMEDY
VCR does not operate.	• Is the LOCK indicator illuminated? • Is the power cord disconnected from the AC output? • Is the TIMER REC indicator illuminated.
The VCR power is on but unit does not operate.	• Is the LOCK indicator illuminated? • Safety devices are operating. Press the RESET button on the rear panel using a ballpoint pen or pencil.
No picture appears on the monitor.	• Is the video cable connected properly, or is the cable defective?
No operation when any tape operation button is pressed.	• Is the LOCK indicator illuminated? • Is a cassette inserted?
Recording does not work.	• Is the LOCK indicator illuminated? • Is the cassette's erasure prevention tab broken off? • Has the tape run out?
Recording cannot be stopped by pressing the STOP button.	• Is the LOCK indicator illuminated? • Is the TIMER REC indicator illuminated?
Timer recording does not operate.	• Is the present time and recording time set accurately?
No operation when the PLAY button is pressed.	• Is the LOCK indicator illuminated? • Has the tape run out? • Is a cassette inserted?
Noise bars in the picture during playback.	• Has the TRACKING control been adjusted?
The picture vibrates at the top and bottom when in the still picture mode.	• Has the POSITION/VERTICAL ADJUST control been adjusted?
Clear camera pictures during recording but during playback the picture is not clear.	• This symptom may occur when the recorder has been used for a long period. During this time an oxide deposit has built up on the video heads, which must now be cleaned. Head cleaning requires expertise. Contact your dealer.
The picture is not clear.	• Is the camera focused?
The present time is incorrect even though the VCR is used every day.	• Make sure the VCR has AC power supplied continuously for at least 40 hours per week.
The power cord was disconnected for less than 31 days but the present time has been reset.	• Make sure the VCR has AC power supplied continuously for at least 40 hours per week. • Contents stored in memory may be erased before the 31 days, depending on the charge time of the power failure compensation circuit. Set the present time again.
Repeat recording does not work.	• Is the repeat recording indicator illuminated? • Is the alarm recording started?
Alarm recording does not work.	• Is the external switch connected correctly?
Playback speed is fast or slow.	• Is the playback mode set to the desired mode with REC/PLAY MODE button?

13.0 SPECIFICATIONS

ELECTRICAL

Power Source:	100-230 VAC, 50/60Hz. (The included power cord is used for 120 VAC, 60 Hz)
Power Consumption:	Approximately 20 watts
Rating:	
ALM/CALL/ MODE	Active: “Low” level, maximum current 50 mA (+5 VDC)/10 mA (+24 VDC) Non-active: Open, maximum voltage +24 VDC.
SET/RST/REC	Active: When terminals are short-circuited or “Low” level voltage applied Non-active: Open
CLK	Recording: A pulse of the frequency division ratio selected in REAR TERMINAL menu

VIDEO

Tape Format:	VHS 1/2" width high-density video cassette tape
Television System:	525 lines, 60 field NTSC-type color system
Video Recording System:	4 rotary heads, azimuth helical scanning system
Luminance Signal:	Frequency modulation recording
Color Signal:	Low frequency conversion, sub-carrier phase shift recording
Audio Track:	1 track

Tape Speed and Recording Time (with T-120 cassette):

Record Mode	Record Time (T-120 Tape)	Record Time (T-160 Tape)	Field (Picture) Recording Rate	Tape Drive Mode	Audio Recording Capability
2H	2 Hrs.	2 Hrs.40 Mins.	60 Fields/Sec	Continuous	Yes
6H	6 Hrs.	8 Hrs	60 Fields/Sec	Continuous	Yes
L12H	14 Hrs.	18 Hrs.40 Mins.	8.5 Fields/Sec	Continuous	Yes
L24H	26 Hrs.	34 Hrs.40 Mins.	4.6 Fields/Sec	Continuous (Slow)	Yes

Fast Forward/ Rewind Time:	Approximately 140 seconds with T-120 cassette
Horizontal Resolution:	More than 330 lines (black & white) More than 240 lines (color)
Audio Frequency Response:	70Hz- 7kHz (2H mode)
Signal-to-Noise Ratio:	Video: better than 42 dB Audio: better than 43 dB
Alarm Recording Time:	Timed: 15 sec/30 sec/45 sec/1 min/2 min/5 min/10 min Manual 1: Until the alarm reset switch is switched on Manual 2: Until the alarm set switch is switched off

Display Format	
DISPLAY MODE 1:	(Month)-(Day)-(Year) (Hour) : (Minute) : (Second) (Alarm recording no.)
DISPLAY MODE 2:	(Month)-(Day)-(Year) (Day of week) (Alarm recording no.), (Hour) : (Minute) : (Second) (Recording mode)
Display Position:	In any position
Timer Program:	8 programs- Daily start and stop time for one week
Battery Backup:	Lasts 31 days
Elapsed Time Indicator:	Maximum of 89,999 hours

MECHANICAL

Heads	
Video:	4 rotary single crystal heads
Audio/Control:	1 stationary head
Erase:	1 full-track head
Motors:	3 direct drive (drum, capstan, loading)
Video Input:	1.0 Vp-p, 75 ohms, BNC plug
Audio Input:	-8 dBs, 50k ohms, RCA plug
Video Output:	1.0 Vp-p, 75 ohms, BNC plug
Audio Output:	-6 dBs, 1k ohms, RCA plug
Connectors	
SET Input:	Screw terminal for starting alarm recording
RST Input:	Screw terminal for finishing alarm recording or for adjusting on-screen clock
REC Input:	Screw terminal for starting/finishing recording or for series recording
GND:	Screw terminal for ground
ALM Output:	Screw terminal for output while alarm recording is under way
CLK Output:	Screw terminal to command camera switching
MODE Output:	Screw terminal for indication of VCR selected mode
CALL Output:	Screw terminal for external warning device or for series recording
REMOTE Jack	Jack for connecting the remote control unit

GENERAL

Operating Temperature:	41°F-104°F (5°C to 40°C)
Relative Humidity:	Maximum 80%
Dimensions:	3.7" H x 16.7" W x 12.4" W (Jog dial included) (9.3 x 42.5 x 31.5 cm)
Weight:	10 lb (4.5 kg)

Weight and dimensions shown are approximate.

(Design and product specifications subject to change without notice.)

14.0 WARRANTY AND RETURN INFORMATION

WARRANTY

Pelco will repair or replace, without charge, any merchandise proved defective in material or workmanship for a period of one year after the date of shipment.

Exceptions to this warranty are as noted below:

- Five years on FT/FR8000 Series fiber optic products.
- Three years on Genex® Series products (multiplexers, server, and keyboard).
- Three years on Camclosure® and fixed camera models, except the CC3701H-2, CC3701H-2X, CC3751H-2, CC3651H-2X, MC3651H-2, and MC3651H-2X camera models, which have a five-year warranty.
- Two years on standard motorized or fixed focal length lenses.
- Two years on Legacy®, CM6700/CM6800/CM9700 Series matrix, and DF5/DF8 Series fixed dome products.
- Two years on Spectra®, Esprit®, ExSite™, and PS20 scanners, including when used in continuous motion applications.
- Two years on Esprit® and WW5700 Series window wiper (excluding wiper blades).
- Eighteen months on DX Series digital video recorders, NVR300 Series network video recorders, and Endura™ Series distributed network-based video products.
- One year (except video heads) on video cassette recorders (VCRs). Video heads will be covered for a period of six months.
- Six months on all pan and tilts, scanners or preset lenses used in continuous motion applications (that is, preset scan, tour and auto scan modes).

Pelco will warrant all replacement parts and repairs for 90 days from the date of Pelco shipment. All goods requiring warranty repair shall be sent freight prepaid to Pelco, Clovis, California. Repairs made necessary by reason of misuse, alteration, normal wear, or accident are not covered under this warranty.

Pelco assumes no risk and shall be subject to no liability for damages or loss resulting from the specific use or application made of the Products. Pelco's liability for any claim, whether based on breach of contract, negligence, infringement of any rights of any party or product liability, relating to the Products shall not exceed the price paid by the Dealer to Pelco for such Products. In no event will Pelco be liable for any special, incidental or consequential damages (including loss of use, loss of profit and claims of third parties) however caused, whether by the negligence of Pelco or otherwise.

The above warranty provides the Dealer with specific legal rights. The Dealer may also have additional rights, which are subject to variation from state to state.

If a warranty repair is required, the Dealer must contact Pelco at (800) 289-9100 or (559) 292-1981 to obtain a Repair Authorization number (RA), and provide the following information:
1. Model and serial number
2. Date of shipment, P.O. number, Sales Order number, or Pelco invoice number
3. Details of the defect or problem

If there is a dispute regarding the warranty of a product which does not fall under the warranty conditions stated above, please include a written explanation with the product when returned. Method of return shipment shall be the same or equal to the method by which the item was received by Pelco.

RETURNS

In order to expedite parts returned to the factory for repair or credit, please call the factory at (800) 289-9100 or (559) 292-1981 to obtain an authorization number (CA number if returned for credit, and RA number if returned for repair).

All merchandise returned for credit may be subject to a 20% restocking and refurbishing charge.

Goods returned for repair or credit should be clearly identified with the assigned CA or RA number and freight should be prepaid. Ship to the appropriate address below.

If you are located within the continental U.S., Alaska, Hawaii or Puerto Rico, send goods to:

Service Department
Pelco
3500 Pelco Way
Clovis, CA 93612-5699

If you are located outside the continental U.S., Alaska, Hawaii or Puerto Rico and are instructed to return goods to the USA, you may do one of the following:
If the goods are to be sent by a COURIER SERVICE, send the goods to:

Pelco
3500 Pelco Way
Clovis, CA 93612-5699 USA

If the goods are to be sent by a FREIGHT FORWARDER, send the goods to:

Pelco c/o Expeditors
473 Eccles Avenue
South San Francisco, CA 94080 USA
Phone: 650-737-1700
Fax: 650-737-0933

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